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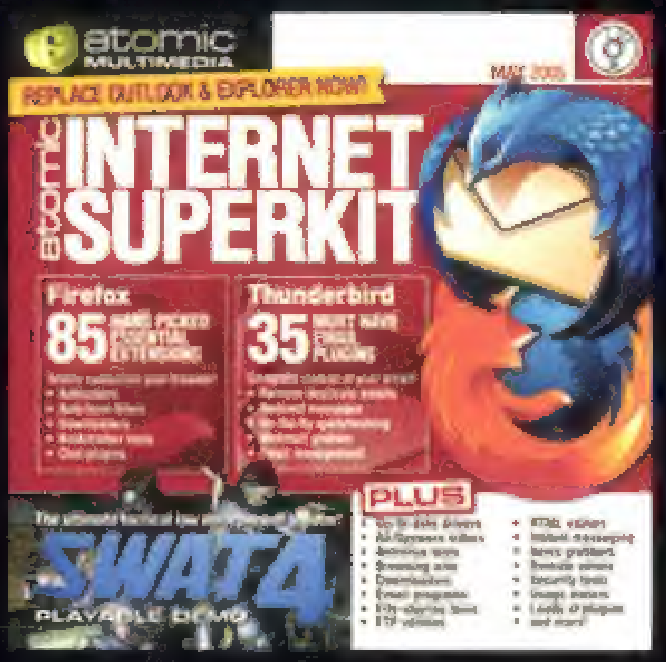

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Antec's new Solution Series models have been tested and listed by Intel® as "Thermally Advantaged Chassis" (TAC). So you know they'll keep the new generation CPUs running cool and stable. And since they're from Antec they have a bevy of other features, too. Like extra-quiet 350 watt SmartPower power supplies and 120mm low-noise fans standard. All at a price that will leave you feeling pretty sharp yourself. For more details please visit www.antec.com .

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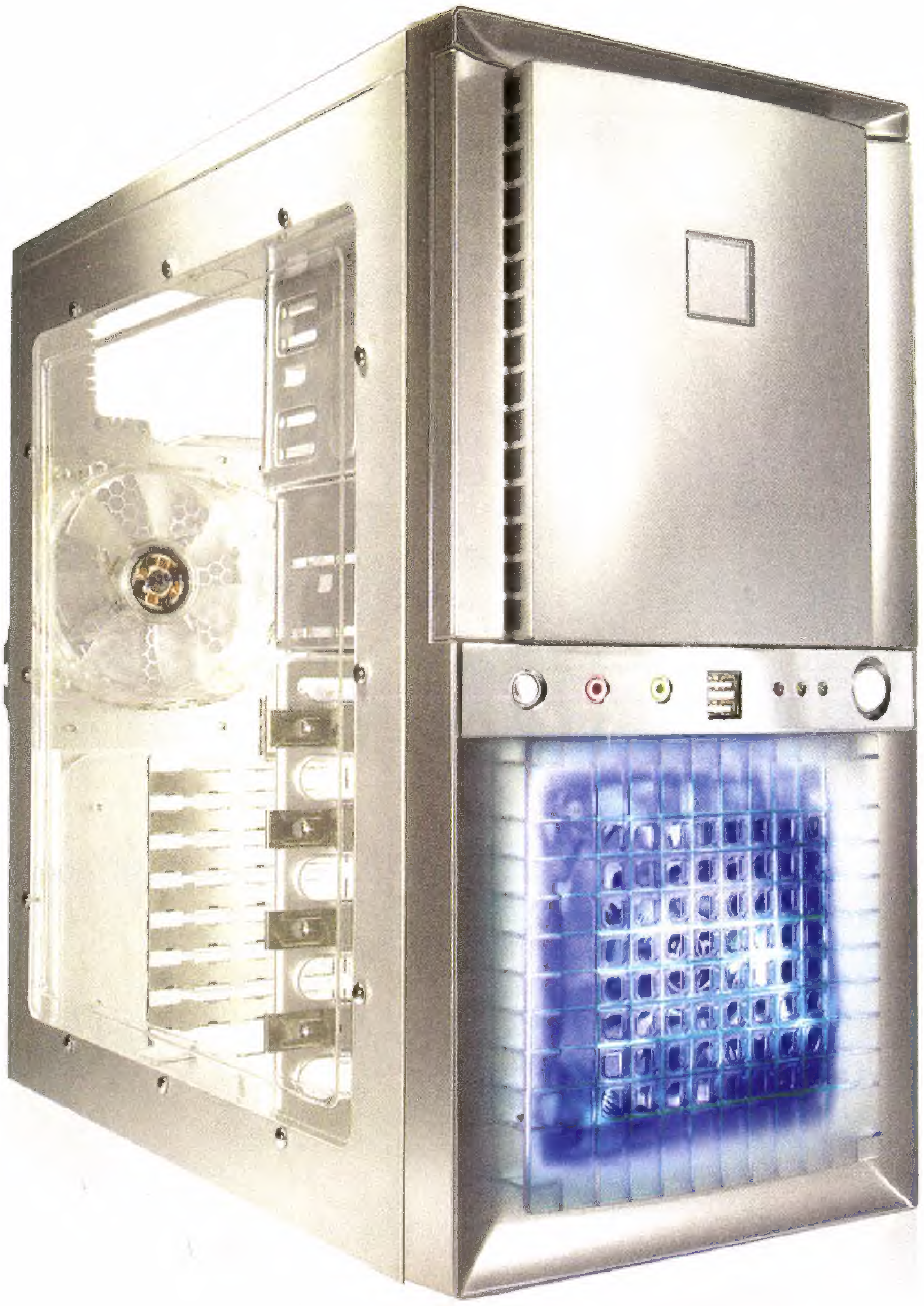

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As veteran gamers say, **'If you can't blind 'em with talent, blind 'em with a bright blue fan.'** We understand. That's why our portable Super LANBOY case boasts an array of eye-catching features guaranteed to dazzle your jealous opponents. Like a lightweight anodized aluminum chassis. A clear side window. And two 120mm fans, including one with vibrant blue illumination. Truth is, it's got everything a gamer could possibly need. Except a healthy dose of talent. To view our full line of products, visit **www.antec-inc.com**

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Future proof

It's not easy staying ahead of the curve, especially considering in our industry staying ahead of the curve is like trying to get a headshot with a high ping. But being *Atomic* we like to stay in the know, connected to the latest developments, and when we're not owning and playing with them, we're dreaming about what's coming next. So it's a natural progression then, during those idle moments while playing WoW, to ponder just what is coming next and what type of beast machine we'll be playing games on in the coming years.

But the pace of change is a fickle creature. PC tech is evolving rapidly, as it does, and right now we're on the cusp of a number of significant developments that are going to change the landscape forever. Dual-core processors, next-gen consoles, GPUs so beefy they could crack Engima in a heatbeat. And that's just the *coming soon* stuff. It boggles the brain to think about how PCs will look, work, and impact us in the months and years to come.

We, as the early adopters, get to explore it sooner than most. If you know what to look for. So we set James Wang, Bennett Ring and Leigh Dyer to task to find out just what's around the corner, and how fantastically awesome it's going to be. The PCs of tomorrow won't just be faster or smaller, they'll usher in performance the nature of which is a geek's wet dream.

So check out the feature and while you're at it, the new games preview section in Gameplay. It's the start of our continuing changes to *Atomic* to make it more of what you want it to be, and more of what we dream it to be. Tell us your thoughts of what you'd like to see, and keep an eye out for what's coming. Like our beloved boxes, it just gets better and better from here.

Ashton Mills

amills@atomicmpc.com.au

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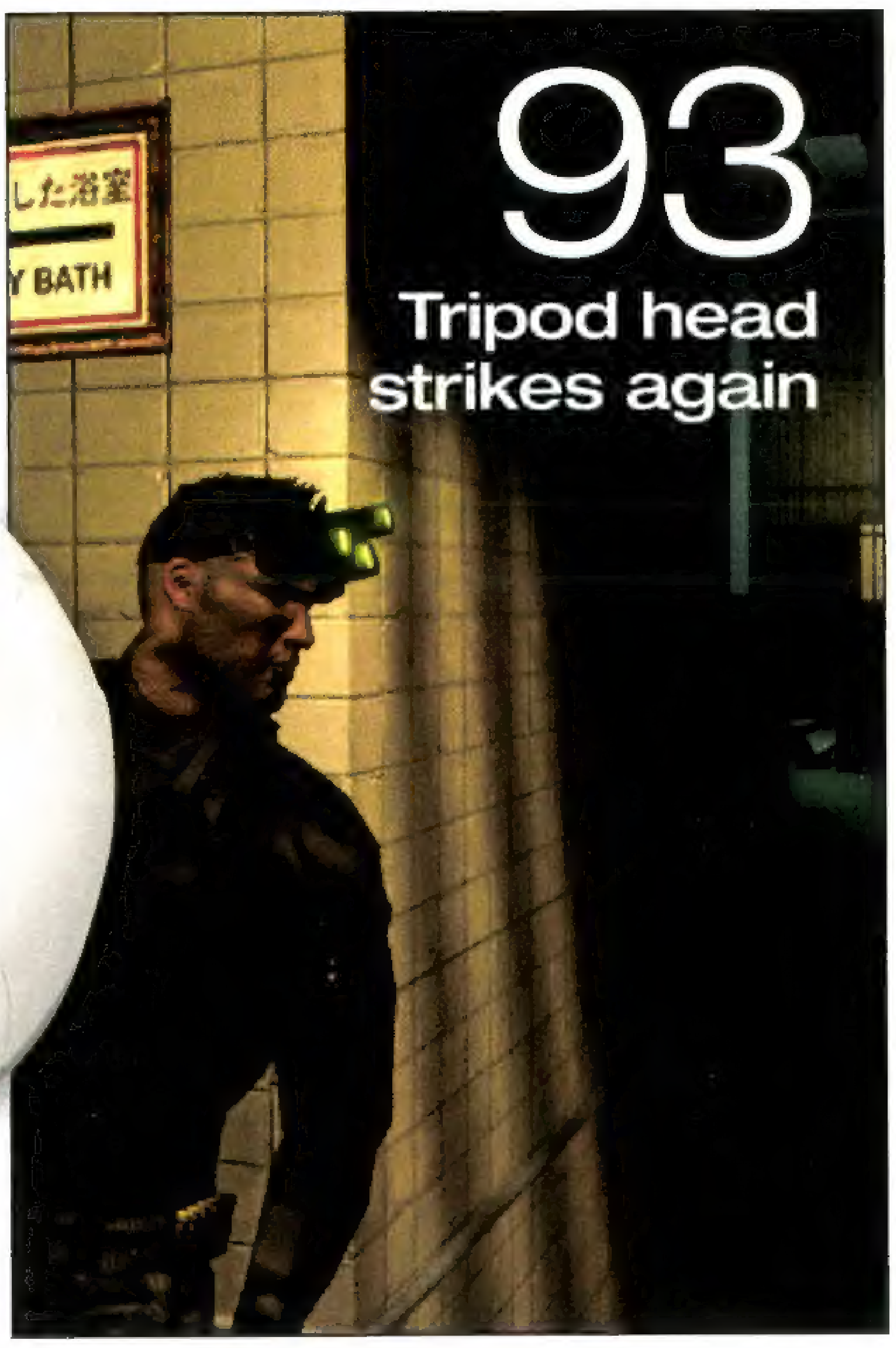

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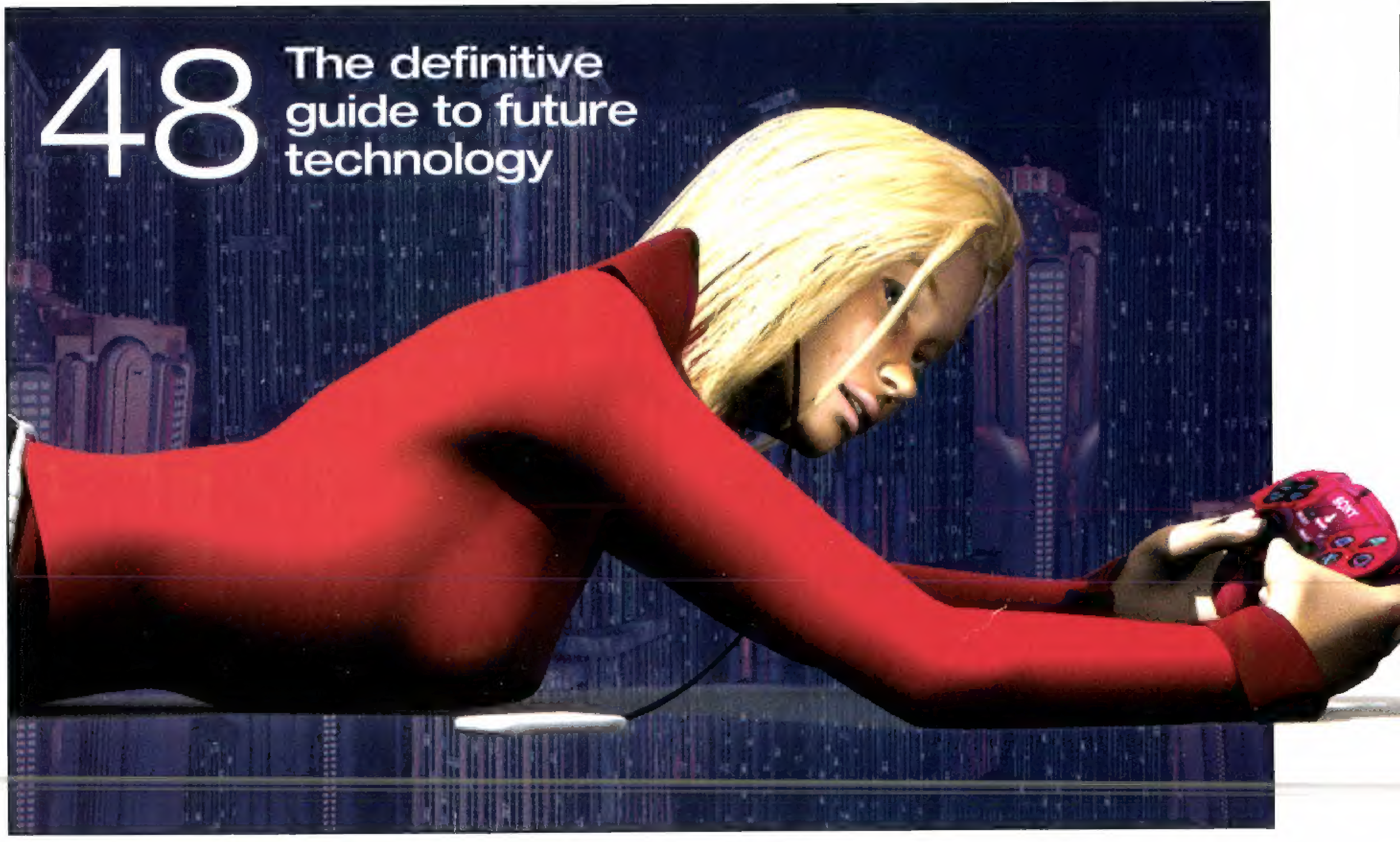

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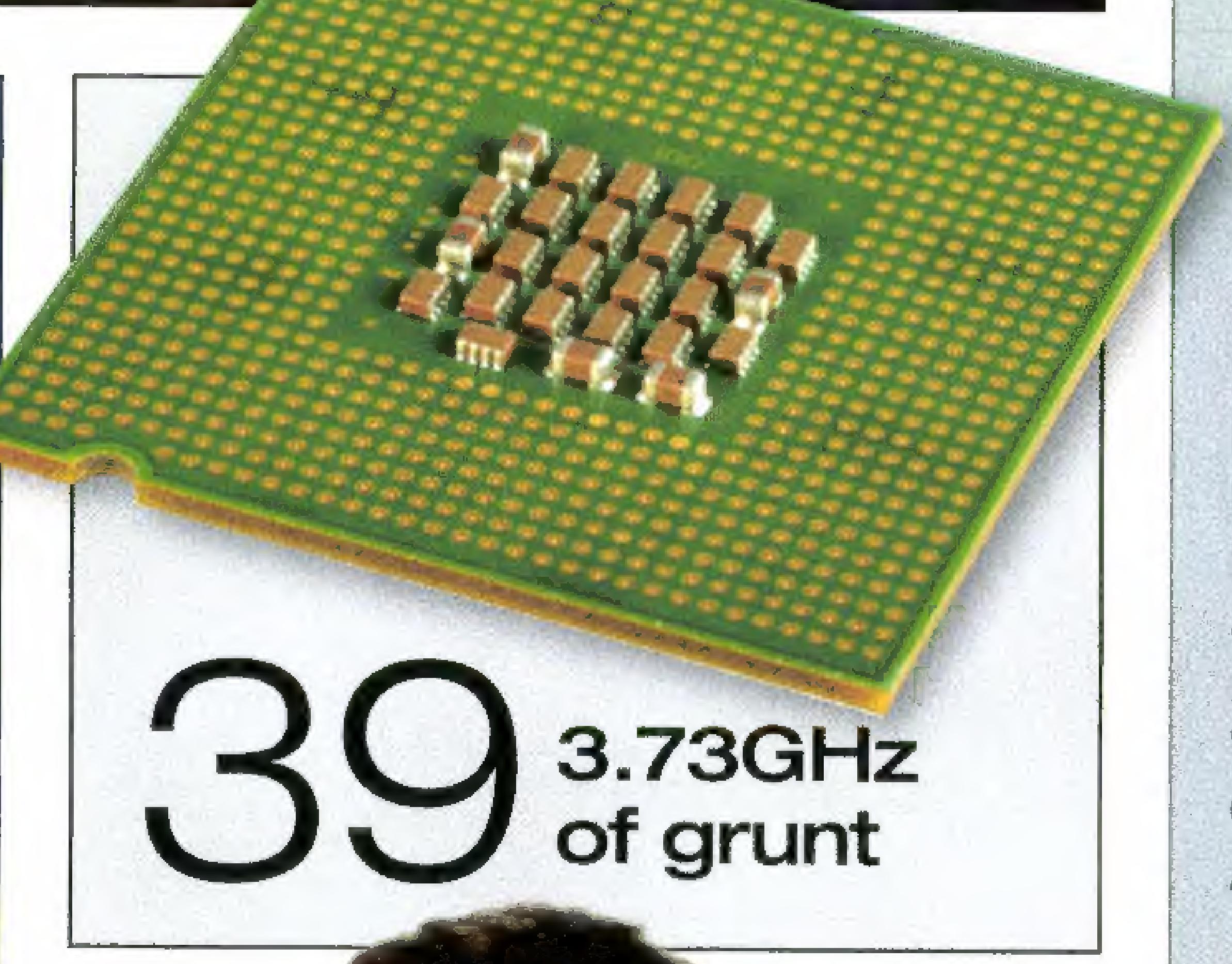
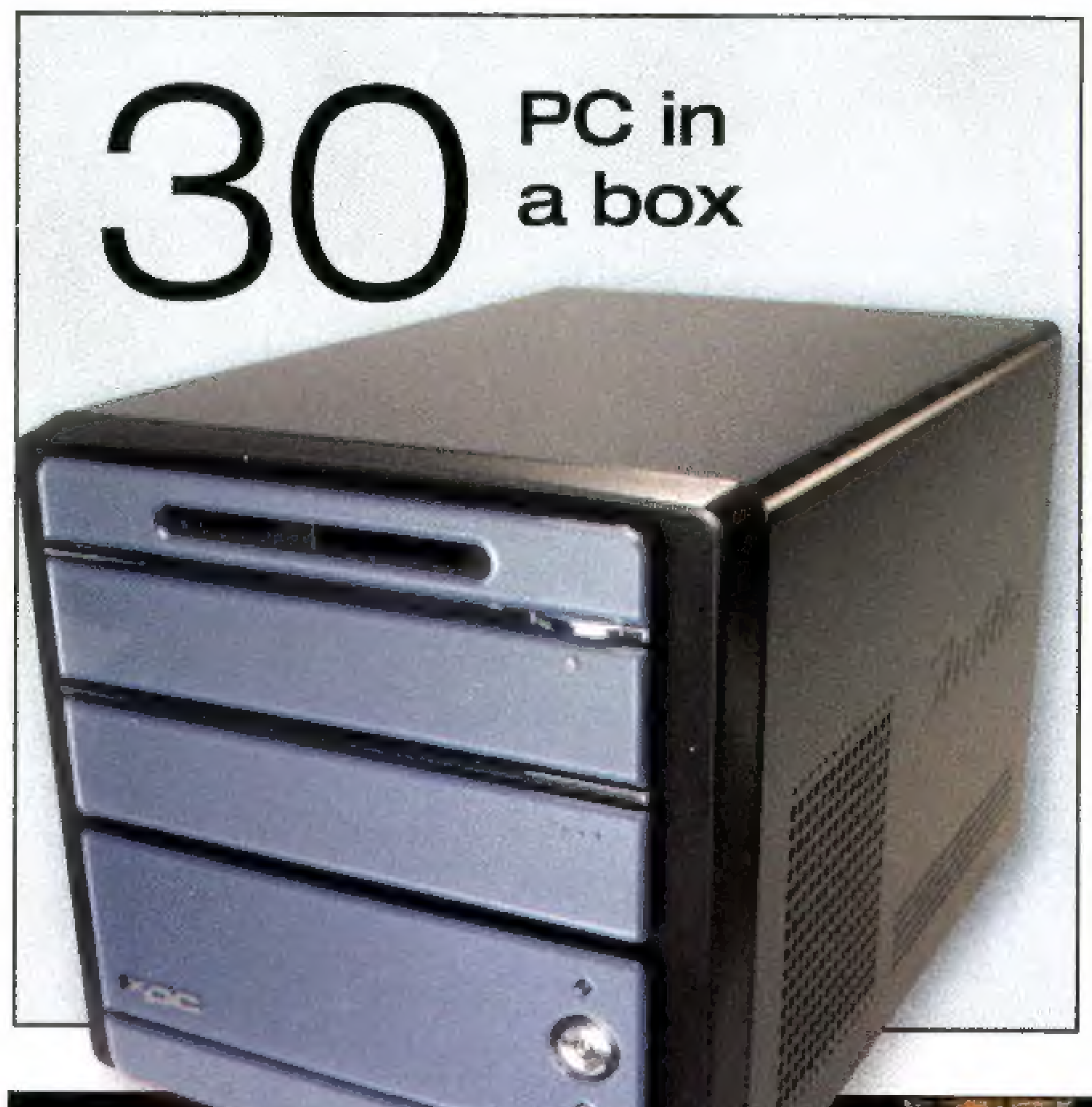


39 3.73GHz of grunt



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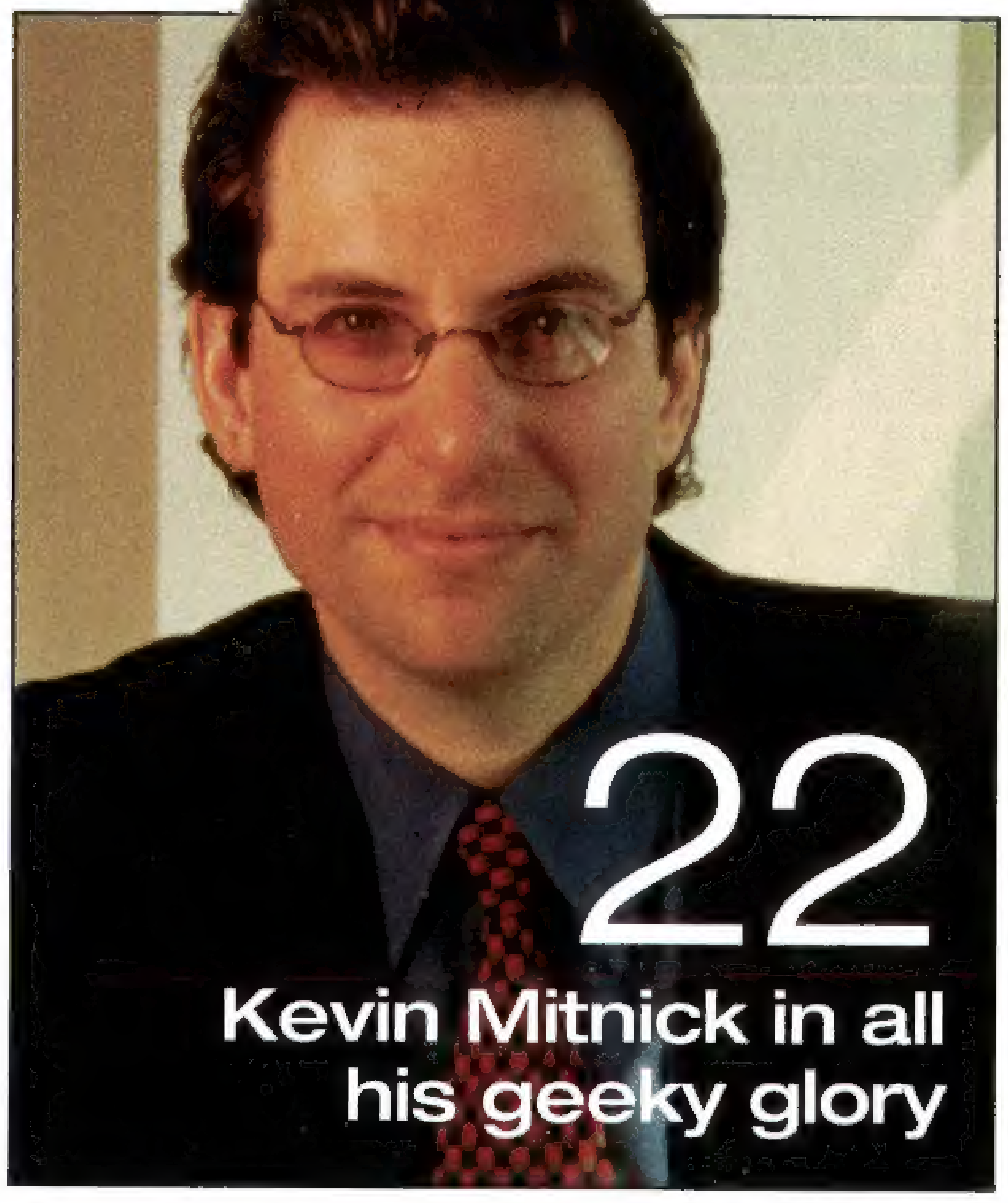

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Internet Superkit

You're an internet junkie. That's okay, we all are.

But if you're not using the right tools, well, you're not much of a junkie really. So, to make sure you're just as high on the interweb as we are, this month's CD contains all the essential net applications to make sure your online experience is a wonderful one.

We've covered everything from adware removers through to usage meters, to the crazy world of P2P file-sharing. With over 85 Mozilla Firefox and 35 Mozilla Thunderbird extensions, you'll also be playing with some of the most flexible and powerful tools on the market. The *free* market.

Also on this month's CD is the first Boot sector for a while, filled to the brim with snapping fresh drivers and essential utilities for the masses – including Adobe Reader 7.0, QuickTime 6.5.2, Java 1.50.1, and a spattering of compression tools. We've also thrown in the SWAT 4 demo, brought to you by the lovely Irrational Games and Vivendi Universal, to satiate your gaming needs.

Why are you still reading this? Plug in the CD, jack-in your modem and get wired!

what's inside

Adware and spyware killers
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HijackThis 1.99.1
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Mozilla extensions archive
Over 85 FireFox extensions!
Over 35 Thunderbird extensions!

Games
SWAT 4 demo

atomic 52 ...what is your porn star name?

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- Six programmable vertex shader pipelines

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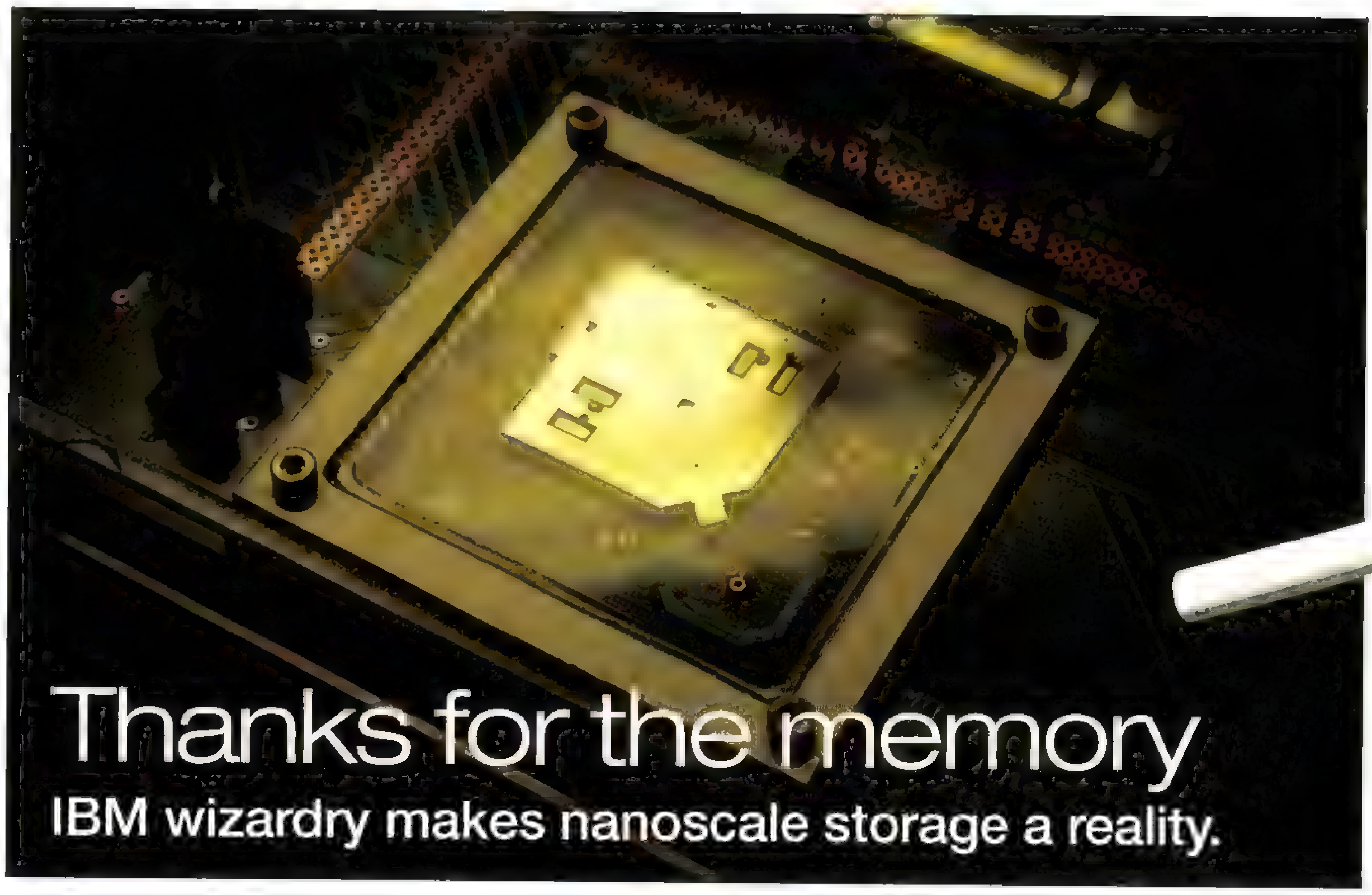


Thanks for the memory

IBM wizardry makes nanoscale storage a reality.

The precise magic behind computing technology has changed radically over the last half a century.

In the beginning, building a PC, or PC component, was mostly a mechanical affair of valves, plugs and gears. However, the advance of technology has shoved computing firmly into the world of science – these days, everything is made in a clean room using sophisticated lithography and manufacturing techniques, themselves the result of research in fields including nanotechnology, quantum mechanics and molecular science.

If any area has advanced in leaps and bounds, it's storage. However, with magnetic-based methods reaching their limits, numerous research firms have been looking for a replacement – everything from massive flash drives to holographic memory. Most of these technologies are still being developed, and it is unlikely we'll see them anytime soon.

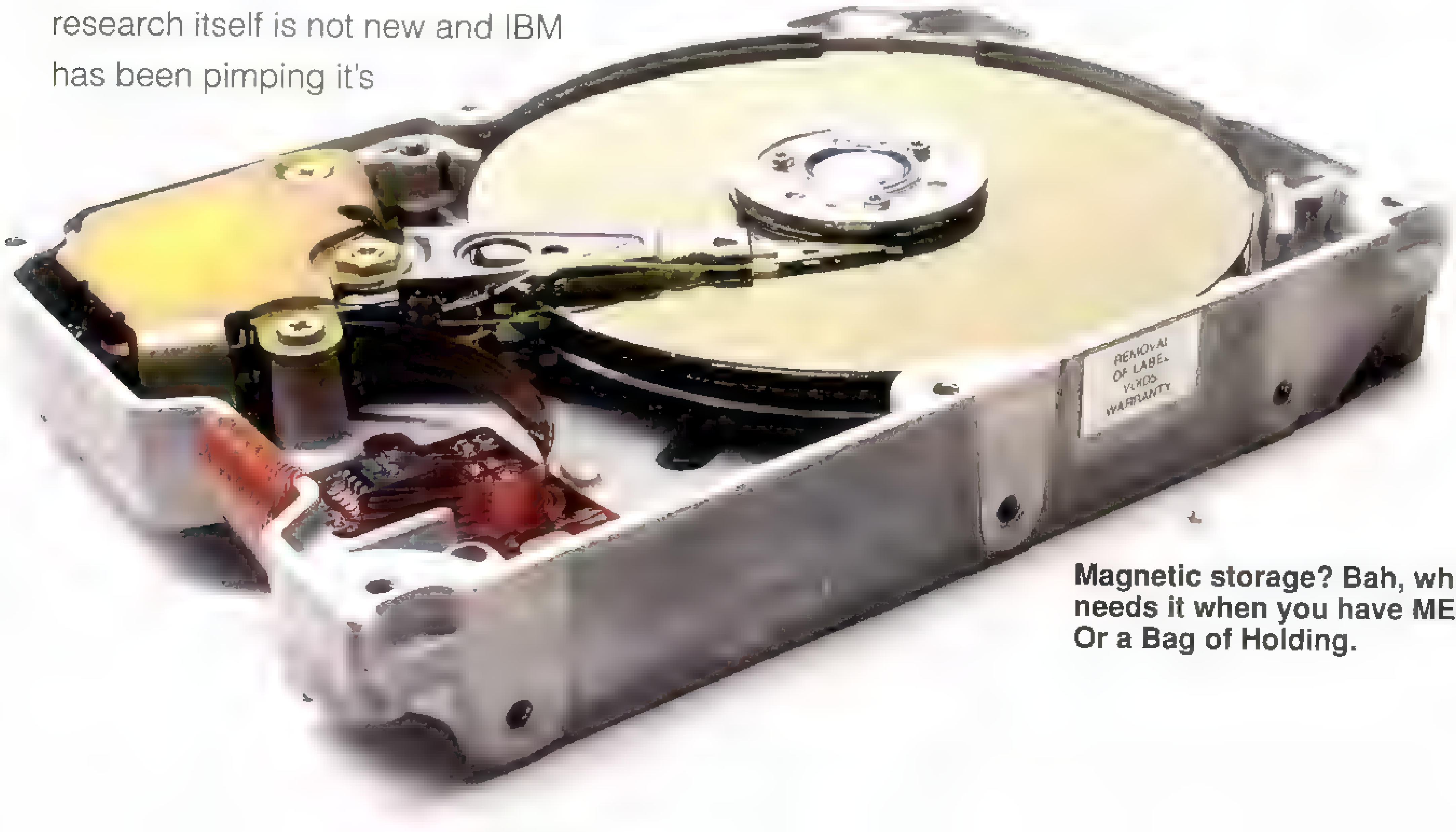
Thankfully, IBM has come up with the goods. Its tech lab in Zurich has devised a working storage chip based on MEMS (Micro-Electro-Mechanical System) technology, one it demoed at this year's CeBit. Based on the science of atomic force microscopy, the research itself is not new and IBM has been pimping it's 'Millipede' nanomechanical storage project for the past five years.

In its current state, the MEMS chips can store up to 1TB of data per square inch – unmatchable by even the largest of today's hard drives, which top out at around 108GB per square inch. And there are plans to improve the chip's capacity.

So, how is this feat achieved? An array of 4096 silicon cantilevers – small pin-like structures – heat up areas of a polymer substrate and leave 'nano-indentations' to record. This also has the affect of changing the thermoelectric properties of the area, which can be read by a special micro scanner.

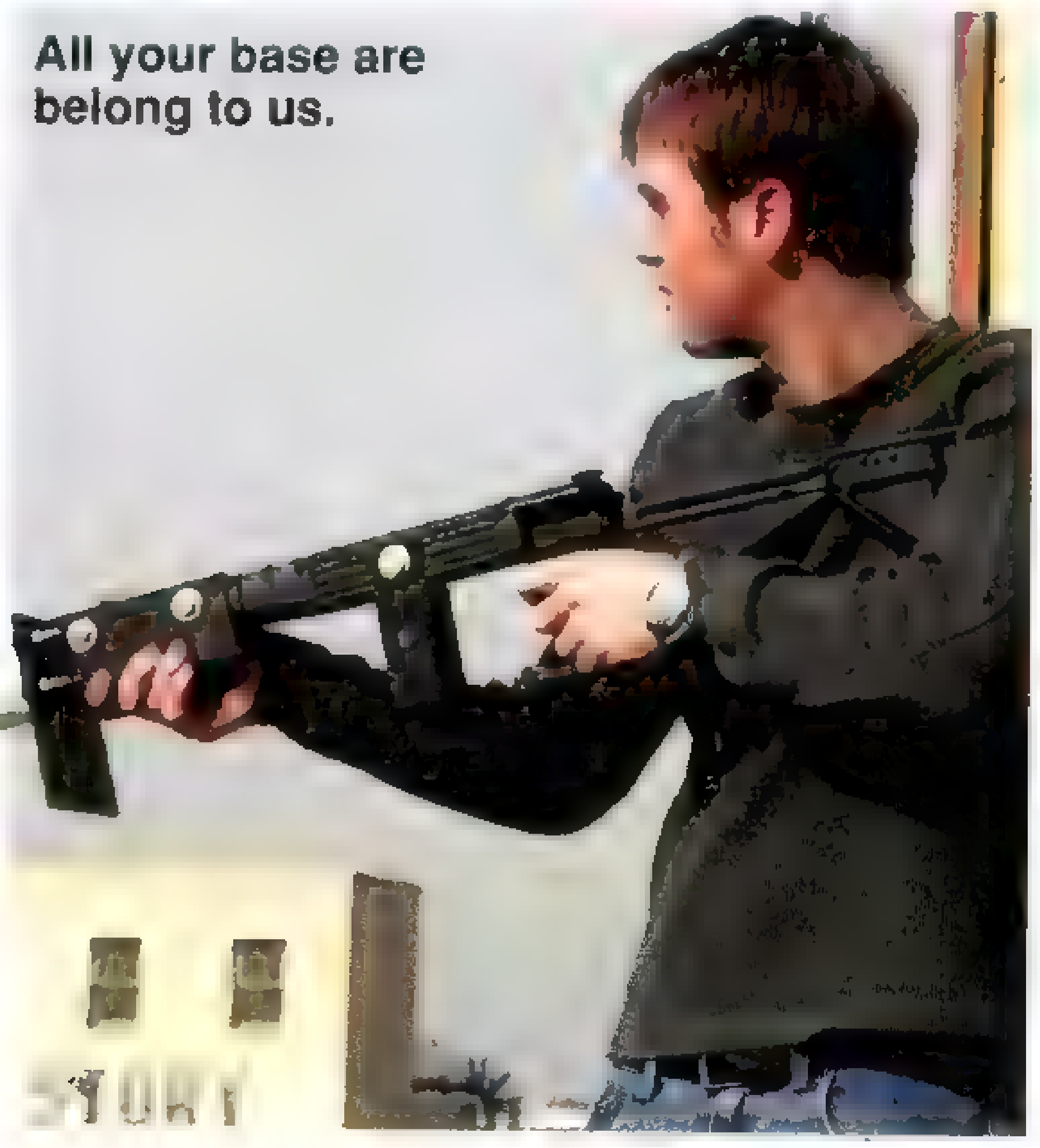
Data is erased simply by heating and applying stress to the area, effectively 'flattening' the indentation.

Currently, the read/write/erase process is being tweaked to improve energy consumption, error rates, and reusability of the storage polymer. While we shouldn't expect Millipede to replace hard drives in the near future, the fact that the technology has been demonstrated, and shown to be practical, is a giant step forward.



Magnetic storage? Bah, who needs it when you have MEMS. Or a Bag of Holding.

shortcircuits



All your base are belong to us.

Fear the day when people start sniping at mobile phones... instead of people. Enter the Bluetooth sniper rifle, manufactured by Los Angeles-based Flexilis. The device, which resembles a bazooka-come-rifle thanks to the high-powered antenna attached to its end, can detect Bluetooth devices up to a kilometre away. Not only does it detect them, it can grab MAC addresses as well and send them to a laptop. Who knows? With one of these babies, you could start firing loads of the Cabir virus into unsuspecting Bluetooth devices...

Sony's Blu-ray recently received a shot in the arm – of sorts – with Apple backing the new compact disc format. Its competitor, the 30GB HD-DVD, while reportedly cheaper to manufacture, can't match the projected 200GB capacity of Blu-ray. In addition to having the support of companies such as HP and Dell, back in January, Vivendi and EA put themselves behind the Blu-ray format also.

Peter Jackson is apparently unhappy with New Line Cinema. How do we know this? Well, he's decided to sue. According to **www.cnn.com**, New Line fudged DVD royalties and didn't audit its sub-distributors, the end result being that Jackson is entitled to some more cash for his epic. The cases only involve the first film in the Lord of the Rings trilogy, *The Fellowship of the Ring* and it's uncertain whether Jackson will chase up his other two films.

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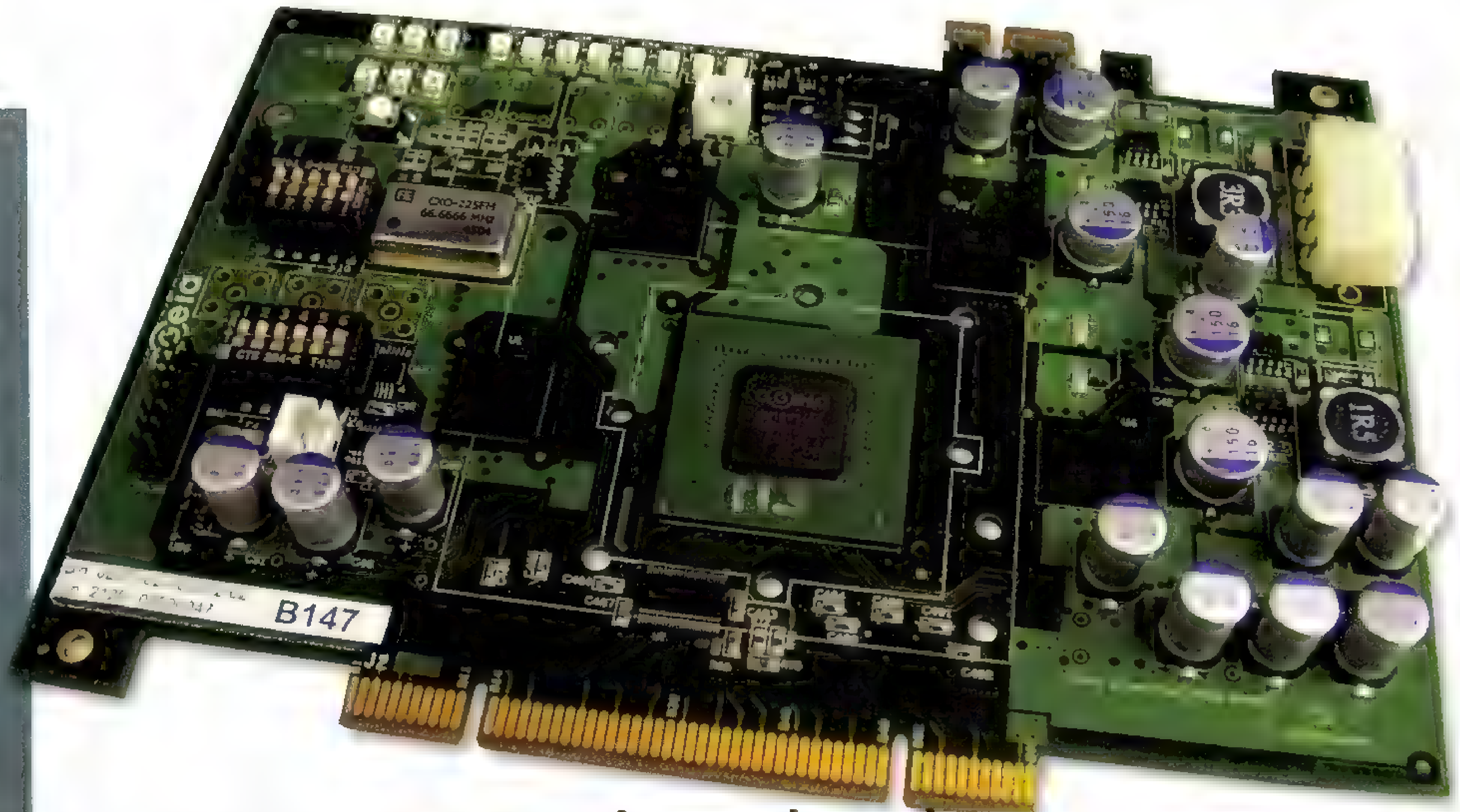
M15+
LOW LEVEL ANIMATED VIOLENCE



Let's get physical

Nathan Davis discovers a groundbreaking revolution in gaming that Bitboys isn't behind.

Games are forever becoming better at pushing the limits of your system. Bigger universes, higher quality textures, better artificial intelligence, advanced filtering techniques, increasingly complex geometry, intricate animation routines, more convincing physics – games aren't quite like they used to be. Ever since the spike of popularity for the 3D GPU in the late 90s, detail levels have exponentially increased.

Physics is one of the more demanding of calculations. It's something that often takes a hit in the shortcut arena of an engine, or a game for that matter, as it requires wads of processing power.

In the past, there was extensive use of pre-scripted animations to emulate physics. Even though there are two processors creating and rendering the virtual worlds we love, they are still highly restricted in terms of portrayable physics. The answer seems to be just around the corner and it comes in the form of the aptly tagged Physics Processing Unit or PPU.

Sitting alongside the CPU and GPU, the PPU is a new dedicated processor (and three-letter acronym for the kitty) for calculating physics in a game – or any virtual world for that matter. This is exactly what AGEIA (**www.ageia.com**) has been working on and it has created what it believes to be the world's first processor dedicated to calculating such physics. Titled 'PhysX', its first PPU chip is programmed with an instruction set specifically designed to handle all physics requirements, whether that be the splash of water or a high-impact-velocity-spleen. Supported effects to date are universal collision detection, rigid body dynamics, soft body dynamics, fluid dynamics, smart particle systems, clothing simulation, soft-body deformation with tearing, and brittle fracturing for destruction of objects.

Not only does it process all the physics of a game world, but it does so in a manner superior to that of current methods, calculating tens of thousands of bones at any one time. This massively expands the horizons, as we're currently limited to a hundred or so with today's CPUs. Not because they're lacking in power, but because they're not specifically built to handle physics tasks.

This PPU is designed to be installed on either a PCI Express or vanilla PCI platform. It packs 128MB of GDDR3 RAM, keeping it completely separate from the CPU and GPU. The current engineering model's power requirements are 25W, so AGEIA is still deciding whether or not an external power source will be required. Following the footsteps of NVIDIA, however, AGEIA will only be manufacturing the actual chips, so it is looking for partnerships to create the final retail cards – which should end up costing around the same as a video card.

To really kick-start things, AGEIA has released an updated SDK for the popular NovodeX physics engine as the PhysX chip's API. Support has already weaved its way into the upcoming Unreal Engine 3, as Epic Games has taken a fond interest in this flash new piece of technology, all thanks to its adoption of the NovodeX physics engine. As Tim Sweeny, Epic's lead programmer stated, 'We've been using the NovodeX Physics SDK with the Unreal Engine 3 for the past year and it has added some awesome effects. It's going to be exciting to see what NovodeX can do once the PhysX chip hits the market.'

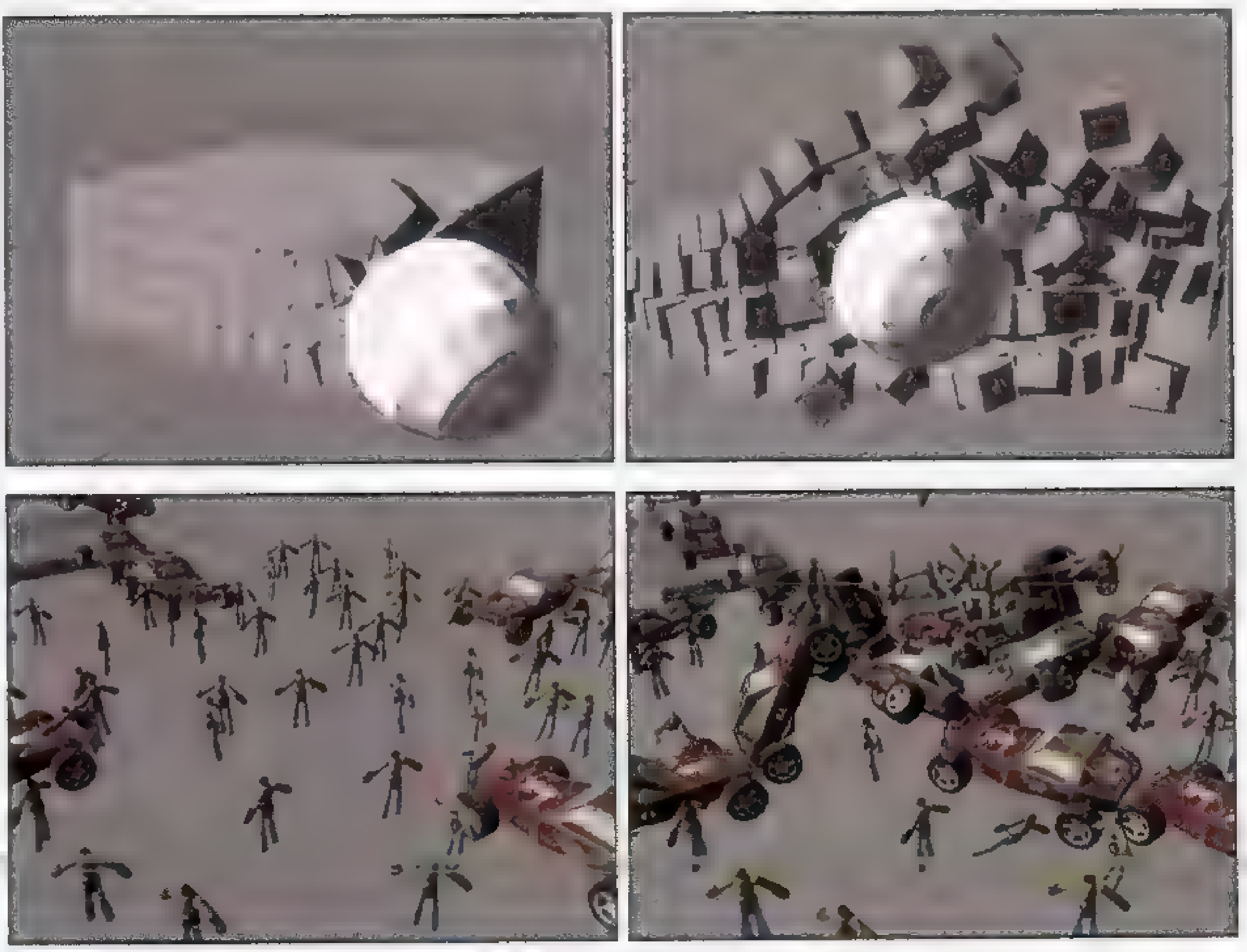
Artificial Studios and Big Huge Games are among other developers coming in early to support this hardware accelerated physics platform in future games.

The hardware is there and developers are obviously only too keen to support it, so we may well see a tasty new card in our machines before too long. Not only extensively superior world detail, but also better AI all thanks to the freed-up processing power.

This is very exciting news for the gaming community and if all goes as planned the dawn of the PPU may be as big as the GPU.

Calculated chaos

Using the impressive NovodeX physics engine as its API, the PhysX chip has a strong foundation. Wiz over to **www.ageia.com/novodex_downloads.html** for a detailed demo of the NovodeX physics engine and, if you're feeling particularly developery, the NovodeX SDK.



Two nifty examples of NovodeX's collision detection, working its magic.

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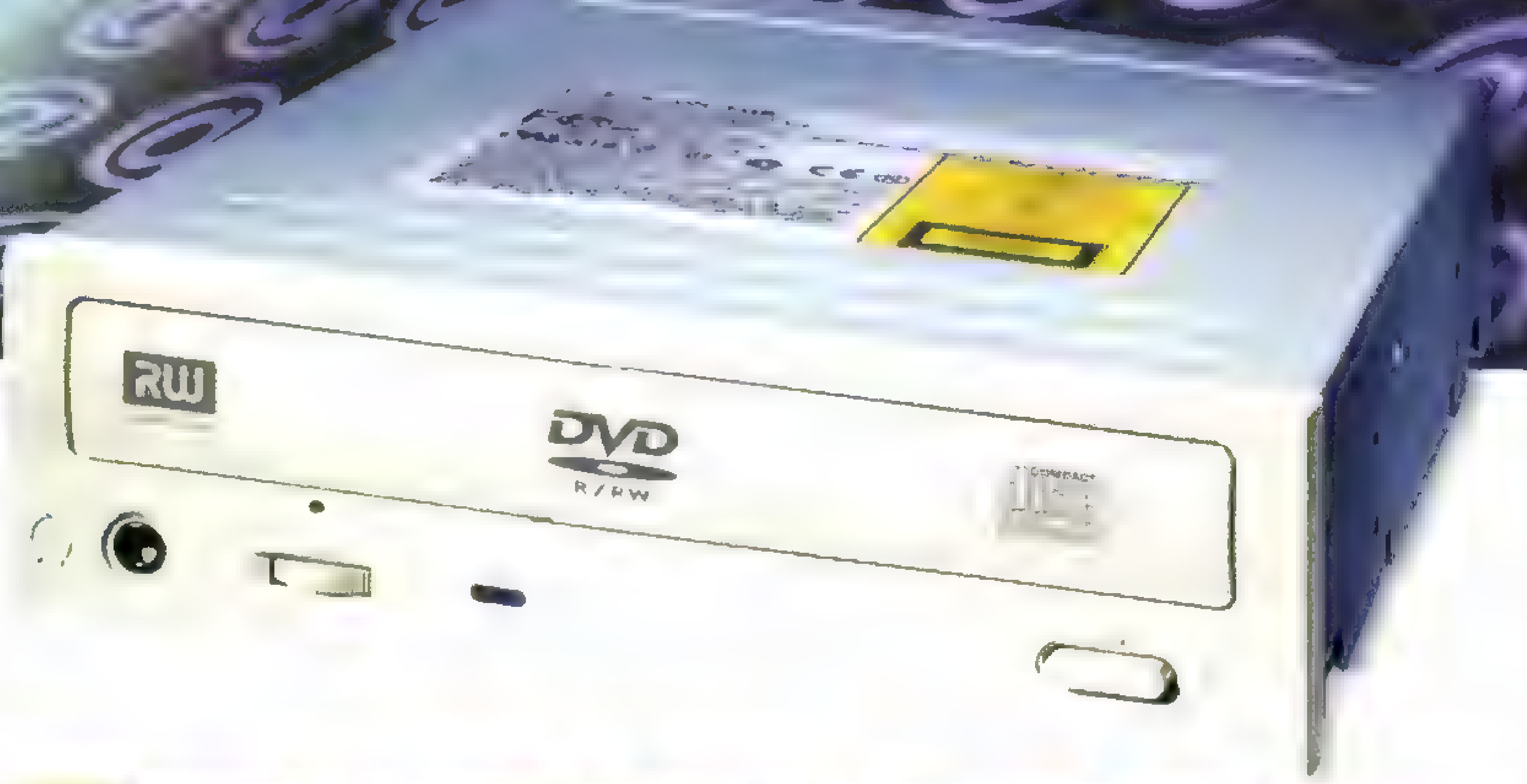

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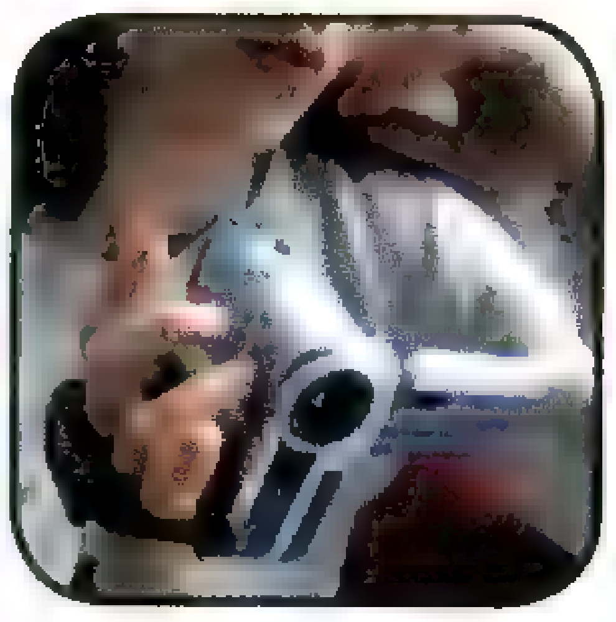
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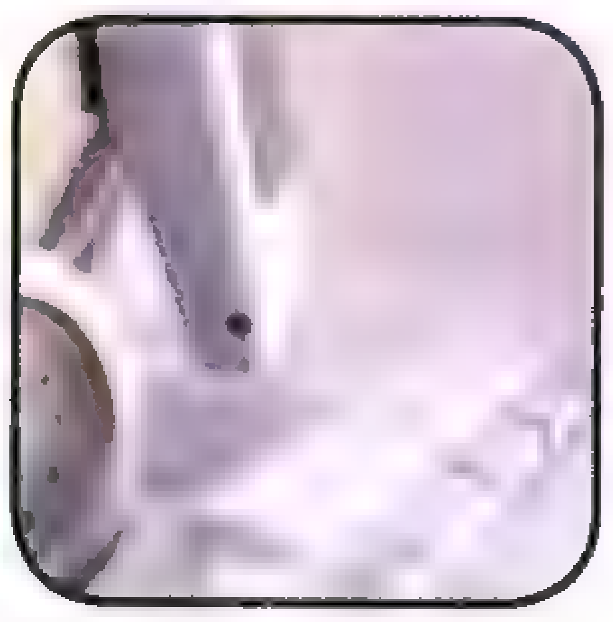
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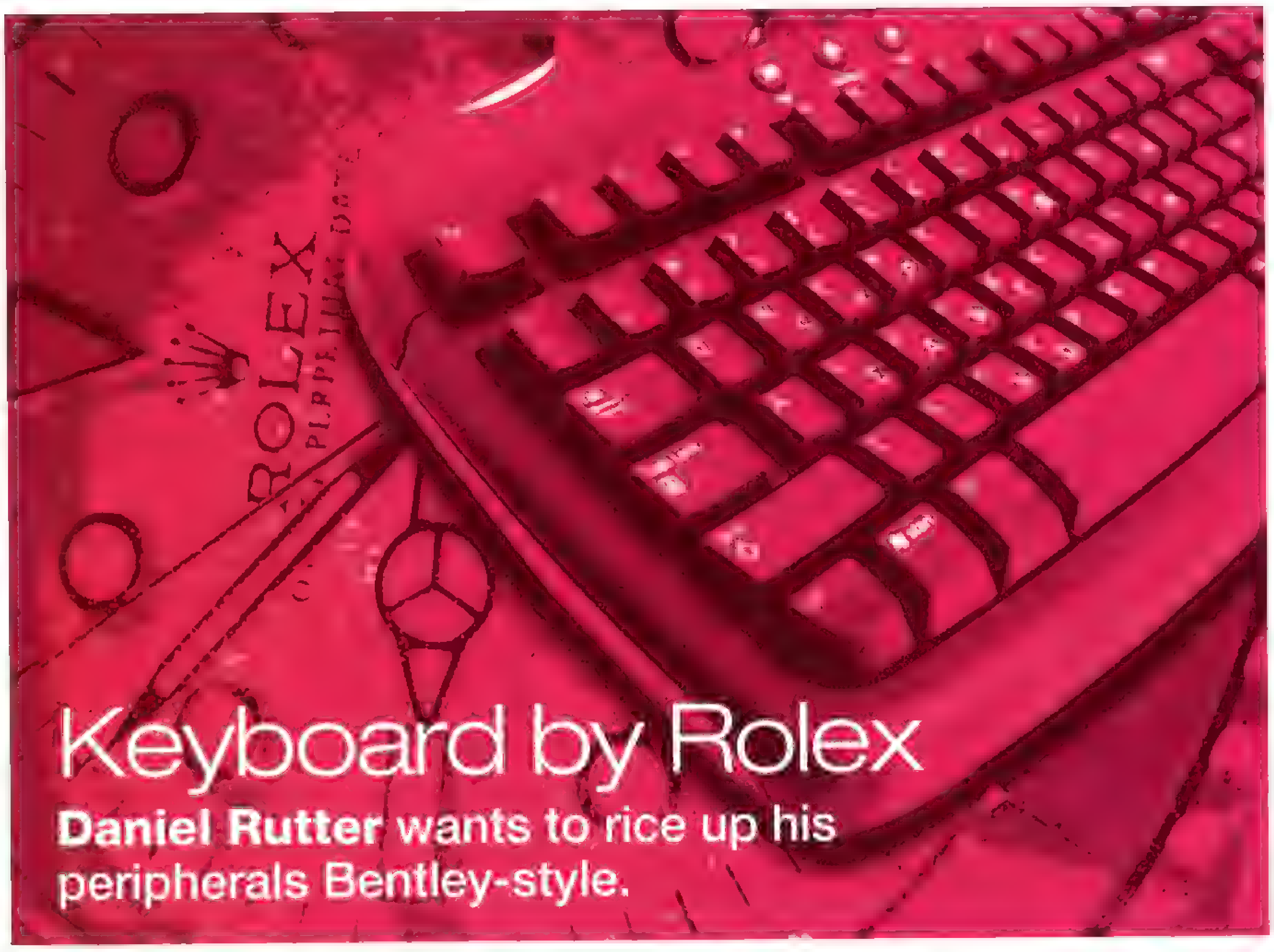

Keyboard by Rolex

Daniel Rutter wants to rice up his peripherals Bentley-style.

Where, I ask you, are the bespoke luxury computers?

William Gibson had the right idea in *Idoru*, with his hardware housed by the Sandbenders in casings made from coral, turquoise and nut-wood. The stuff inside might be your standard Ono-Sendai cyberdeck, but the exterior should be a joy to behold and handle.

I don't know about you, but I spend a large fraction of every day beholding and handling computers, and I could certainly cope with a little coral. Beige plastic and powder-coated steel are cheap and durable, but there's a reason why Rolex don't make watches out of these materials.

> **If money is no object, of course, you can have that keyboard with the genuine narwhal ivory keys of which you've always dreamed.**

You can get this sort of thing in the car world, you know. Sure, most people settle for normal mainstream reviewed-in-the-newspaper vehicles, but there are more exotic options.

Spyker in the Netherlands make cars whose interiors look like bordellos for billionaires. Various manufacturers have come up with minimalist open-wheeled road projectiles driven by superbike engines – occasionally two of 'em, sharing a crank. There are jet motorcycles and stretched Humvees and companies that recondition old Eastern Bloc all-terrain troop transports that can't be killed with a stick. You name it, you can get it, and often not for that ludicrous a price.

What all of the weird cars have in common is that they're made for a small market. Annual production of the real oddities may not get into double figures – while Toyota makes more than a million Corollas a year.

But in the computer world, everything's mass-produced. Everything. Even companies like Alienware that sell spiffy-looking high-spec machines don't fabricate anything themselves; every part is OEMed by someone else, and if there's some particular case design it uses that nobody else has, you can bet that it still won't be made out of mahogany.

If money is no object, of course, you can have that keyboard with the genuine narwhal ivory keys of which you've always dreamed. Just as there are customisers that can make you any kind of car you want pretty much from scratch, there's nothing stopping you rounding up some artisans to make computer components the same way.

Except, of course, the fact that you'd end up with a computer that cost at least as much as the abovementioned popular Toyota.

A few fancy-computer companies are trying to find a middle way, almost invariably with wooden PC bits. Some of the stuff they sell looks pretty lame to me – wooden siding on a steel computer case is not what I'm after here, much less techno-widgets iced out with Swarovski crystals – but wood-cased monitors, keyboards and mice are a step in the right direction. And the prices can be right – see **www.swedx.com**, for instance. Or **holzkontor.us**, for the other end of the price spectrum.

The problem, of course, is that computer gear ages fast. A gloriously retro micarta-Bakelite-and-celluloid laptop will be a lot more retro, in a bad way, in a few years – and you won't be able to retrofit new hardware into it.

Some devices, though, are likely to endure. Input devices, in particular; plenty of heavy typists hammer away on buckling spring keyboards that haven't changed in 20 years (and yes, some of those 'boards are that old and still working), and the all-surface optical mouse seems to have reached the same evolutionary level now. Build a mouse or keyboard to last and it ought to stay useful until our computers start talking back to us in Majel Barrett's voice.

When you have a lifespan like that, there ought to be a market for a ten-times-as-expensive version with burr walnut and engine turned stainless and glove leather and cocobolo-wood buttons. And, of course, quality switchgear that feels good and lasts, which is something that seems to have evaded the wooden-keyboard crowd so far.

The market for such products would of course largely be composed of executive oxygen thieves who're attempting to convince themselves that they're men of distinction. But if the status symbol crowd drives sales of things that I want to own for non-poseur reasons, that's fine with me.

Don't get me wrong; I like a great military-industrial case mod as much as the next geek and typing on plastic isn't exactly killing me. But if people will spend thousands of dollars to put shiny spinning things on the outside of their mag wheels, I find it hard to believe that a keyboard that looks like a Bentley dashboard wouldn't find a market.

There is only one Dan. Send him an email on dan@atomicmpc.com.au

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It ain't a Repco, Jack

Ben Mansill is no Nigel, but he still loves his supremo technology.

Sex is wherever you look in Formula 1. Every little curve and corner of an F1 car is sculptured art. It's not hard to stare at one for hours. Or maybe it is. Thinking about one naked is even better. From the arse-end to the stick-out-bit up front, there's stuff packed in that makes an F-16 look like a relic from the 1970s. Down the back, the engine is a block of screaming technology that stirs your heart, soul and trousers. Up the front, the Lucky Bloke sits cocooned in carbon fibrement, gripping the horniest peripheral ever, ever, ever.

> **...the Williams' F1 designers used a cluster of 96 1.3GHz 64-bit Itaniums with a Quadrics interconnect. Bitchin!**

It lives in a garage royally festooned with screens of glory. No sci-fi starship bridge comes close to looking as cool as these displays. Incomprehensible yet irresistible graphs rise and fall like a mating chimpanzee. Columns of numbers blur at X times a billion squared.

It is little wonder that tech fans gravitate towards F1. We like the raw meat of V8 Supercars too, because we're not without a primal soul. But F1 is the sharp end of racing, so that's the leg we puppies like to rub up against.

Because the Victorian Government is a big suckarse, we recently ate up our annual 14 million government dollar F1 treat, down the back in the garden state. Thanks Jeff!

Because I'm a freeloading junket whore, I recently enjoyed a visit to the race, chillin with the Williams BMW team. Thanks HP!

Anyone who watched the telecast – the whole all-day thing – will have enjoyed Neals on Wheels' garage explaino-jobs. The 'OMG this is so cool' segment. The big numbers and the deep-inside tidbits. Well, this is the computer version.

Hi, I'm Ben Mansill, and today we're inside (!) the Williams team garage. OMG.

It's damn clean in here. Clean like an Intel clean room. Clean like the toilet at your mum's place. Clean so the gear stays in good working order and impresses sponsors and fanboys like me.

There are two banks of LCD displays, half a dozen in each. They're funky-arse 21in jobs because they don't dick around around in F1. One set of displays is for the Williams engineers, the other for the BMW blokes. Each shows telemetry from the car – up to 200 streams of data at any one time. Everything is measured. E-ver-y-thing. That data is sent realtime to Williams' headquarters in Grove, UK, while the BMW data is also sent to that company's German HQ.

During a race, the boys on the ground can and do call on the engineers at the head offices for in-depth analysis of the numbers. To keep things efficient across this WAN, only updated information is sent. This is new. Until recently all data was replicated with each send. It's illogical and bandwidth intensive, but the smaller volume of data in days gone by made it a non-issue.

A third display rack is out the front, under the awning at the edge of the race track. That's where F1 team bosses (the correct title for these guys is in fact 'Supremo') get the distilled data, using it to get tactical all over the enemy team's arses. They also watch themselves watching themselves on telly. A Supremo perk.

All this kit is ruggedised. It finds itself in an extreme variety of conditions, and has to handle the bumps and drops of travelling to a new country every couple of weeks. The Williams' blokes reckon that the only failures they had with their gear through the whole 2004 season were two fans that carked it. Ruggedised gear being what it is, which you now know all about thanks to *Atomic issue 51*, is relatively low tech. Williams' want reliable computers that do the job when asked.

All very nice, but getting there in the first place meant designing a car for the job. And for that, my lovelies, the Williams' F1 designers used a cluster of 96 1.3GHz 64-bit Itaniums with a Quadrics interconnect. Bitchin! While not a true parallel processing supercomputer, the Quadrics cluster makes for easy scalability, should Intel happen to have any spare Itaniums in the inventory... The cluster was used for aerodynamic modelling using Flued Computational Fluid Dynamics, resulting in all the little poke-out-bits you see on any F1 car, which smooth the airflow over an intrinsically unsmooth shape. Crash testing is also simulated, which saves big bucks.

Next time you watch an F1 race and try to imagine the crankshaft spinning at 300 revs a second, spare a thought too for the wonder of computer gear that created it all. Then try and imagine the size of the universe. Same headspin. Same beautiful bigness of supremo power.

Let Ben know how fast your crankshaft is!
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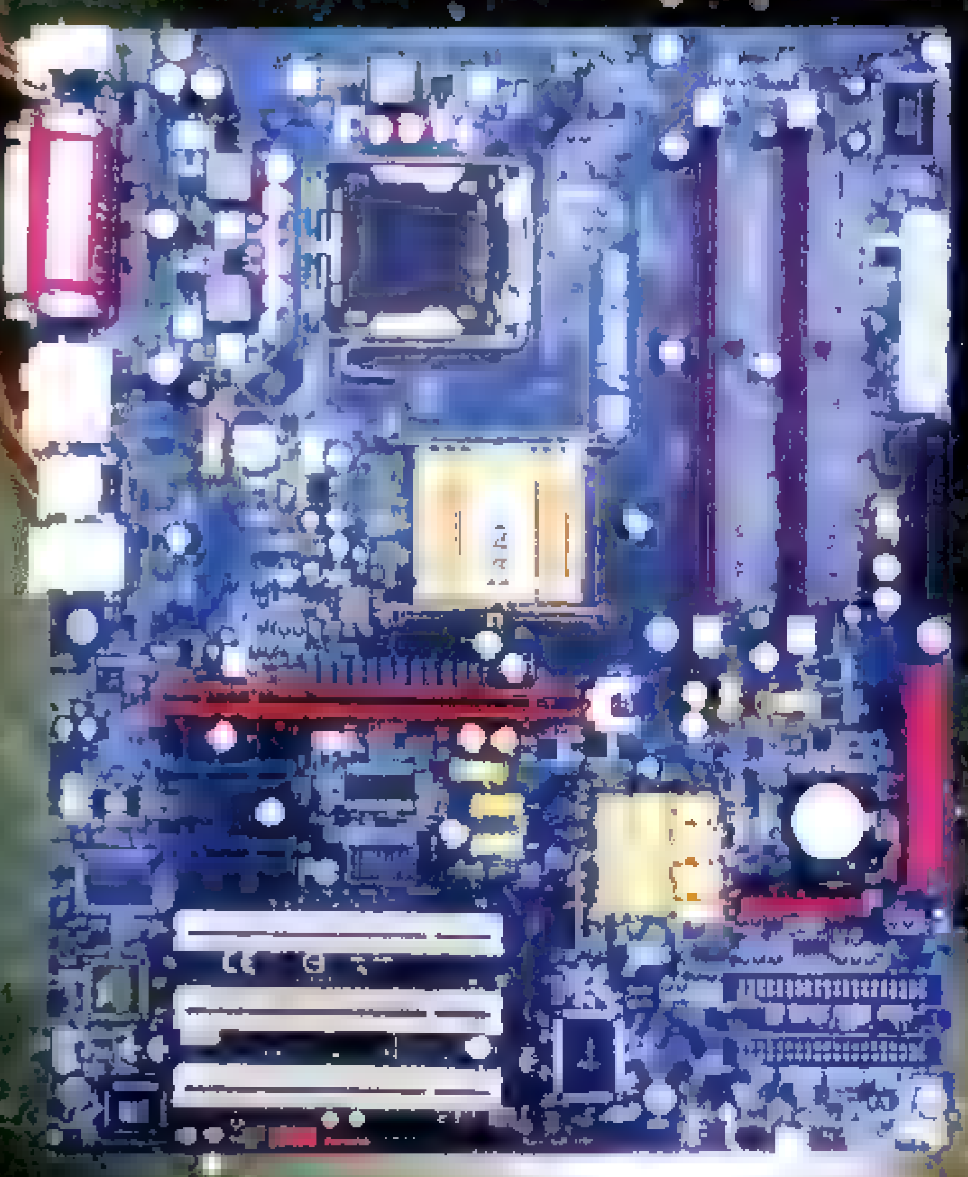

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Blue response!

Wow, there's a lot of whingers out there. Tim Dean complains about complaining complainers.

Dear sir. I am disgusted with the way old people are depicted on television. We are not all vibrant, fun-loving, sex-maniacs Many of us are bitter, resentful individuals who remember the good old days when entertainment was bland and inoffensive. The following is a list of words I never want to hear on television again: bra; horny; family jewels...

Thus spake Grandpa Simpson, representing every bitter, resentful whinger who's ever written an indignant letter of complaint.

I nearly wrote a complaint letter once. I had a nasty experience with a particularly surly customer service rep from a major telco a couple of years back. They not only didn't listen to the problem I was trying to sort out, but they gave me the total run around with false information and bum leads, and they capped it off by being rude and overtly bored.

Standard fare for many call centres perhaps, but in my early years, I actually spent some time as a call centre monkey. As such, I both know the pain of the average customer service rep, as well as the fact that it's not that damn hard to be polite, attentive and professional, by gum.

> **The pity is, the constructive stuff tends to get lost in the noise, which is an even greater tragedy.**

So, there I was, finger poised above keyboard – a naked Word document awaiting a deluge of self-righteous indignation – before I finally came to my senses.

It's not that I think the letter might not have done some good. It might have prompted a 'team leader' to have a quiet word to said surly operator, and get them to smarten up and treat their job seriously.

But look at me! I mean, 'smarten up and take their job seriously'? That'd be like my not giving money to a street kid because I thought they were going to spend it on drugs.

It's for this reason that I reckon a quick straw poll would find that most of the culprits behind complaint letters pack a grey mop (or a blue rinse), have a framed letter from the Queen on the wall, and have far too much time on their hands.

Until recently, that is..

I've noticed a new and disturbing phenomenon, and I'm not entirely sure what to make of it. After playing World of Warcraft for a couple of months now, I've been known to troll the official forums for any choice morsels of advice, update news or just to see what people are thinking.

What blows me away is the sheer volume of complaints that litter that forum. Now, it's hard to ascertain someone's age from forum posts, but there are a few tell tale pointers.

One is mastery of the English language, another is choice of emphatic adjectives (cussing...) and the final one is perspective. So, using this entirely unreliable ageing method, it appears as though most of the complaints are coming from the younger players, and it's actually the older ones who are calling for restraint, patience and tolerance.

I don't know if I'm entirely comfortable with this role reversal. Then again, in WoW circles, I probably am on the older end of the spectrum, but I drink beer and kiss girls, so my friends seem to forgive me. And let's not forget that I'm complaining right now...

The thing that really curries my goat is the nature of the complaints. They usually consist of this special breed of whinge that demands attention and insists that Blizzard pays special notice to their ill thought-out, overly emotional and grammatically aberrant ponderings. I can't say I've seen more than one in twenty valuable, constructive criticisms on that forum. The pity is, the constructive stuff tends to get lost in the noise, which is an even greater tragedy

It makes me feel sorry for Blizzard really. Makes me want to give it a big hug, pat it on the head, and tell it everything is going to be alright. Then again, it has enough money that it can probably buy all the sympathy it needs. Or the entire island of Guam.

This is by no means a new phenomenon in MMO circles, and I guess developers have to live with it as a pitfall that comes with the territory. One thing that Blizzard certainly has learned the hard way is that efficient and detailed communication to the players is essential. Personally, I think it has done a great job communicating – it still has plenty more it can, and should, do – but I'm pretty happy with the way it has managed things so far. And if you don't agree, feel free to complain about it... on the forums, of course.

Tim has never seen the sky! Tell him what it's like.
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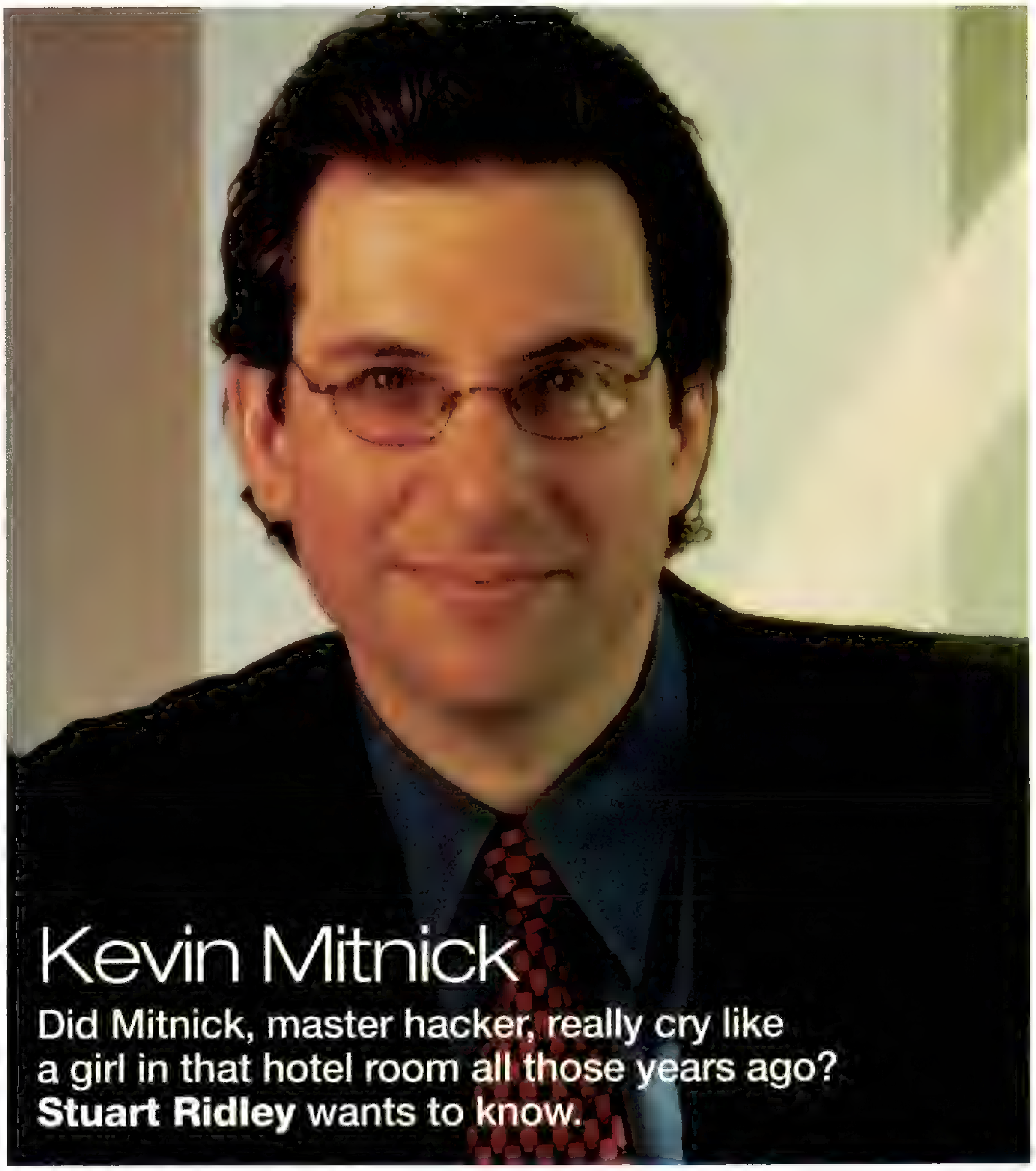


Kevin Mitnick

Did Mitnick, master hacker, really cry like a girl in that hotel room all those years ago? Stuart Ridley wants to know.

atomicbio

Name	**Kevin Mitnick**
Occupation	**Security Consultant**
Websites	**www.defensivethinking.com** **www.freekevin.com** **www.takedown.com** **www.gulker.com/ra/hack** **jthz.com/kevinstory.htm**

If you were once the world's most wanted hacker and you'd been put away three times for your crimes, would you want to lay low and hope everyone forgets about you? Or would you put a white hat on your infamy and build a legit security consultancy? Kevin Mitnick chose the later and he's now making good money telling the corporate world how to cover its arse. Funnily enough, more has been written about how he was busted than about any of his skills or knowledge – will the release of Mitnick's second book, *The Art of Intrusion*, change that?

The myth of Kevin Mitnick precedes him everywhere. As you know, he's been a phreaker, a hacker, a social engineer and even a security consultant... which all adds up to mean that a lot of people want a piece of him. *Atomic* asked Mitnick to chew over innocuous topics such as Paris Hilton's phone hack, his dislike of most Slashdotters, and the motives behind hacking.

Atomic: Let's start with a cheeky accusation: between you and Matthew Broderick you changed the public's perception of hackers forever – how do you plead?

Mitnick: Ha ha ha! Well, I guess I did bring a lot of awareness to the area of phone phreaking and computer hacking through my escapades of many years ago.

In fact, coincidentally, a friend of mine knows Matthew Broderick and Matthew said that the next time I'm in New York he could probably hook up with me.

That'd be hilarious to have some pictures with him, wouldn't it?

Atomic: Yes. It's kind of a funny connection. In the movie *War Games* he was apparently able to start a nuclear war – and hell, that was something you were accused of being capable of if you'd been allowed access to the prison pay phone...

Mitnick: Unfortunately, one of the journalists who wrote a libellous book about me called *Takedown* [John Markoff, who wrote the book with Tsutomu Shimomura] basically took that idea from *War Games*. He said in a story that I hacked into the Pentagon in 1983 and nearly started World War III! So Matthew Broderick as an actor, I guess, had a significant impact on my reputation – but not through any fault of his own!

Atomic: How about the film about you based on John Markoff & Tsutomu's book *Takedown*? Give us a 10-second review of the acting...

Mitnick: Aside from it being not true about me and using my real name, but none of the real events... the film was terrible. It was terrible acting – the only redeeming quality was that Skeet Ulrich played me. I mean, all the other talent was no talent! Maybe it wasn't as bad as *Swordfish*. But that would have been a cool scene maybe, you know, that first scene of *Swordfish* in my movie. I'm kidding...

Atomic: Well... *Swordfish* had two things going for it...

Mitnick: Yeah and that was about it! But that's as much truth as some of the journalists have. Unfortunately there's this 'myth of Kevin Mitnick' that was single-handedly created by some journalists who wanted to profit.

Atomic: It seemed Markoff and Shimomura were riding your story just to make names for themselves...

Mitnick: Well, I think it was more Markoff than it was Shimomura. Shimomura was more being vigilante and it was Markoff who saw the dollar signs. It was about Good versus Evil – creating a Western in cyberspace, or whatever. And he was the one, I think, who persuaded Shimomura to track me in the first place.

Atomic: Well, given there are these 'fictions' out there – the books and film – what are you doing to gain the trust of corporations?

Mitnick: Obviously my transgressions are known to be things of the past and I'm continuing to do successful work, like co-authoring books, doing public lectures around the world and doing private security consulting. I'm getting a lot of clients by referral and by word-of-mouth, and everyone that I work with is satisfied. Of course, I'm sure there are going to be some companies out there that are reluctant to work with me based on the past. You even have companies like Symantec who swear up and down they'd never hire a hacker and yet Kevin Poulsen – who spent five years in prison – is their editorial director for SecurityFocus, right? Maybe he's not an employee… maybe he's a contractor. A lot of the successful security companies today were started by hackers who did illegal things – like Christopher Klaus who founded ISS (Internet Security Systems) and Mark Mayfray who was raided by the FBI and started at e-Eye. People who were the unethical hackers of years ago have now transformed into the security professionals – the white hats – today. And I am one of them.

Atomic: Now, for our younger readers who are interested in getting into security, there's no way in hell we can recommend they cut their teeth doing illegal activities!
Mitnick: No – of course not! And I wouldn't suggest that anyone did. That's just how it happened. Just like with Apple Computer: how they got the money to build the Apple circuit board was that Steve Jobs and Woz sold Blue Boxes on Berkeley campus. Would you encourage your kids to sell Blue Boxes? No. Of course not. It just happened. That's life. What I encourage people to do if they want to learn about computer security is set up a network with friends. If you want to learn about vulnerabilities by hacking into your friends' computers you can do it legally and still experience the same pursuit of knowledge. Of course, you don't get the same *thrill* of being sneaky... but encouraging people not to trespass into peoples' computers is important.

> **That was part of the components: it was an intellectual challenge, it was pursuit of knowledge, being somewhere I shouldn't be...**

Atomic: How much of what you used to do was about that thrill of being sneaky?
Mitnick: That was part of the components: it was an intellectual challenge, it was pursuit of knowledge, being somewhere I shouldn't be… The thrill seeking was kind of like going into the *Star Trek* sitcom: 'going where no hacker has been before'. My first attraction was telephones and that's why I went after all the mobile phone companies when I was hacker: to get the source code for the mobile phones so that I could see the brains inside these things.

Atomic: What are your thoughts on the Paris Hilton phone hack? How would you...?
Mitnick: Well... I was chuckling when I found out that Fred Durst got hacked too!

Atomic: Oh man, you didn't watch that video did you? It's…anyway, how would you...?
Mitnick: What was funny was that you'd have to be a complete moron to have your sex vids with your girlfriend on your Sidekick. I mean... like... why? What's he going to do? Sit at the bar having drinkies by himself one night and go and have a look at the sex vid? What's possessed this guy? With Hilton, I guess they thought she'd have some... you know, naked shots ... you know the girl. I believe that social engineering could have played a part in getting her password, because with Caller ID spoofing it would have been relatively trivial to go onto T-Mobile's website and do a password reset and it SMSs it to the phone.

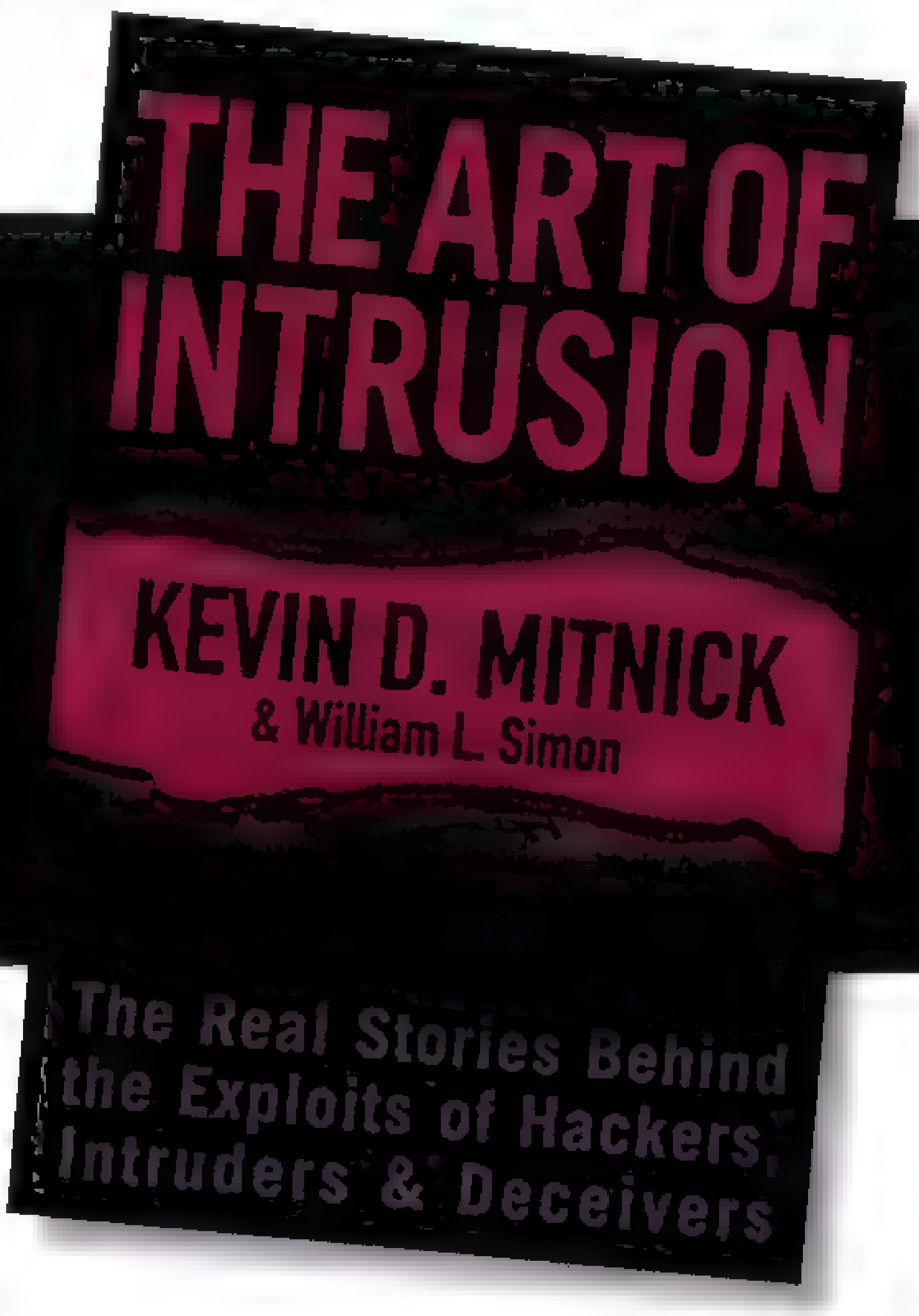
[They] can, with Caller ID spoofing, call her phone and it says 'T-Mobile Customer Service calling' and she'd have no reason to believe that it wasn't T-Mobile Customer Service, and you'd ask her to read off the SMS. And then they'd just log onto her T-Mobile account online and they'd access ... everything. Or... she could have just chosen a simple password, like her dog's name. Who knows?

Atomic: One of the things the *Atomic* community is into is pulling something apart. Is that something you're still into – the hardware hacking side?
Mitnick: I've just bought a Zaurus [Sharp's PDA] and I'm thinking about taking that thing apart. But I'm afraid of taking it apart because I want to make sure I can get the damn thing back together. I bought the Zaurus because it runs Linux on the PDA platform. I'm doing a talk on wireless security, so I have to use it for 802.11 stuff, Ethereal stuff.

Atomic: How do you feel about some of the tech community's response to your books and work, for example, in places like Slashdot…
Mitnick: I don't even read Slashdot... they're a bunch of… well, a lot of the people on there are trollers!

Atomic: So you don't care about their reaction?
Mitnick: Most of them are trollers. Someone sent me something that said 'Ooh… Is he out yet?' I mean... stupid... trollers. OK, not all of them, but a lot them.

Atomic: Well, some might say that your security business, your lecture tours, and your books are among your greatest achievements in social engineering...
Mitnick: No I wouldn't call it social engineering, because that means it's a deceptive practice...


THE ART OF INTRUSION
KEVIN D. MITNICK
& William L. Simon
The Real Stories Behind the Exploits of Hackers, Intruders & Deceivers

Atomic: Well that's basically what you have been accused of.
Mitnick: Right. That's because they're jealous.

Atomic: Maybe that's what motivates people to attack systems – because they're jealous?
Mitnick: I have no idea what their motives are.

Atomic: Ah. To understand a hacker's motives, does someone tracking them down have to have been a hacker or at least know how they think? In the same way TV detectives say they need to think like a serial killer to hunt one?
Mitnick: I wouldn't analogise it to a serial killer... but they have to understand the technology and how it works. How connections are made. And it could be that the attacker is easy to detect because they're doing a direct IP connection from home. Or they could be very clever, sitting on a mountaintop ... pointing a wireless antenna at a wireless access point and it would be extremely difficult.

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Inside the Cell processor

You're looking at 9 CPUs, 100GB/s of bandwidth and more than 256 billion floating point operations a second – on one chip.

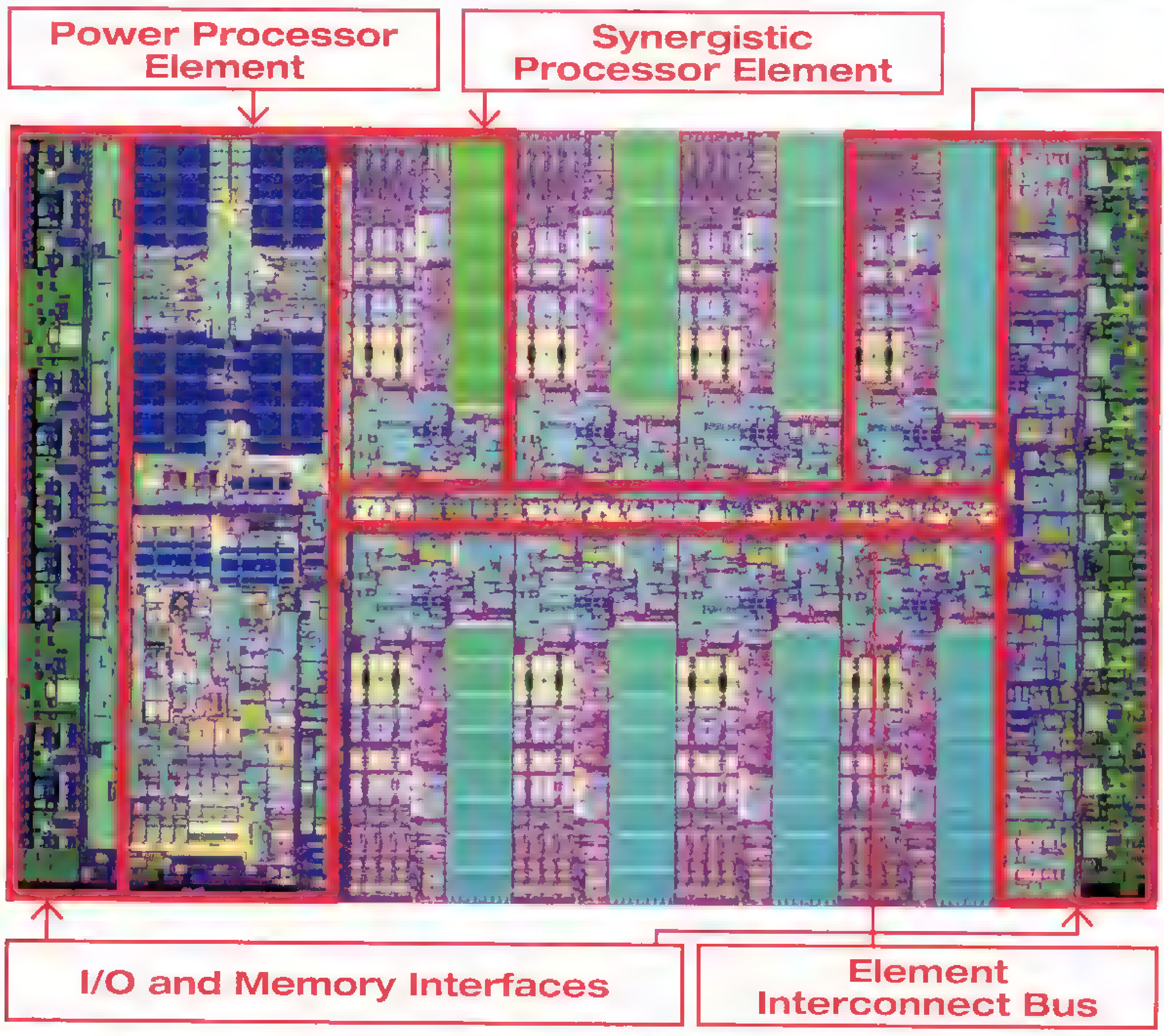
The GHz boom was fun while it lasted. Now that CPUs have hit the power wall, a new approach is needed. IBM, Sony and Toshiba reckon they have the solution; a new processor architecture called Cell.

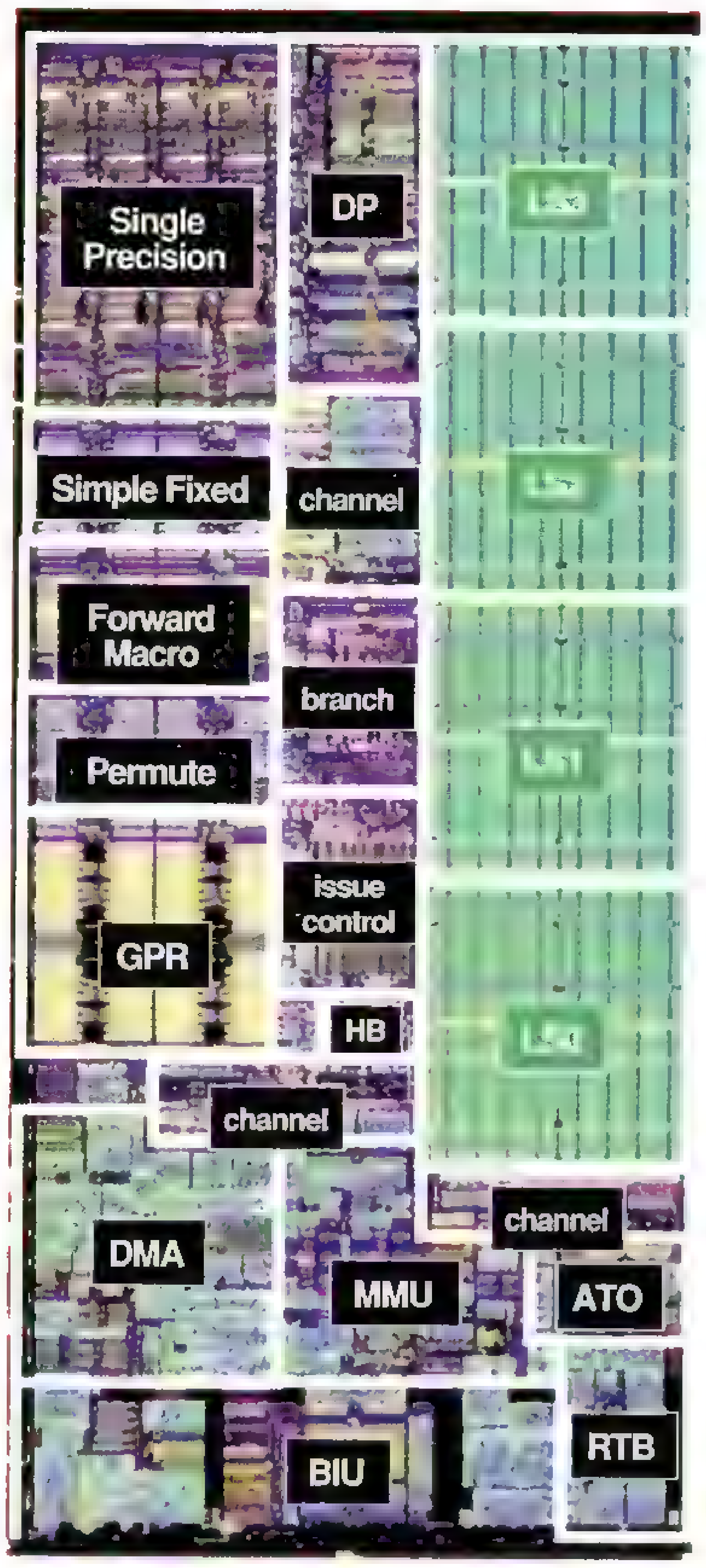
Cell started as a project between the three companies in 2001. The goal was to produce a processor 'optimised for compute-intensive and broadband rich media applications,' according to IBM's Peter Hofstee. Of course that's just code speak for 'CPU for the Playstation 3 that will demolish the competition'.

Central to Cell's architecture is scalability and flexibility. Cell is flexible in that the number of cores on each CPU can vary depending on the intended use. It's scalable in that two Cell CPUs can be linked together using glueless SMP and more can be linked using a high speed switch. A workstation rack loaded with Cell processors has a theoretical processing power of 16 teraflops – just under half of the performance of the Earth Simulator supercomputer in Yokohama. Of course it won't be that fast in reality, but we're sure you won't mind it powering your next PlayStation. The three companies also have plans to make use of the chip in other hardware.

how it works

Cell is unlike any other consumer processor ever devised. It uses 9 CPU cores; one custom PowerPC core (PPE) to take care of the operating system and 8 'Synergistic Processor Elements' (SPE) to do the real work. The PowerPC core hands out the work and the 8 SPEs do it. While the PowerPC core has L1 and L2 cache just like any other processor, the SPEs do not. Instead each SPE has what is called 'local store', which is 256KB of on-die memory that is managed by the programmer. Each SPE works on 128-bit registers in SIMD fashion so that four 32-bit floating point operations can be computed in one cycle. At 4GHz, this gives each SPE a theoretical power of 32 gigaflops a second. With eight SPEs, the Cell processor reaches a quarter of a teraflop. To feed such a monster, Rambus XDR memory is employed. There's a main memory interface that connects the Cell processor directly to memory at 25GB/s. There's also a pair of configurable 'FlexIO' interfaces allowing Cell to talk to other components at 76.8GB/s. All up, Cell has over a 100GB/s of off-chip bandwidth.

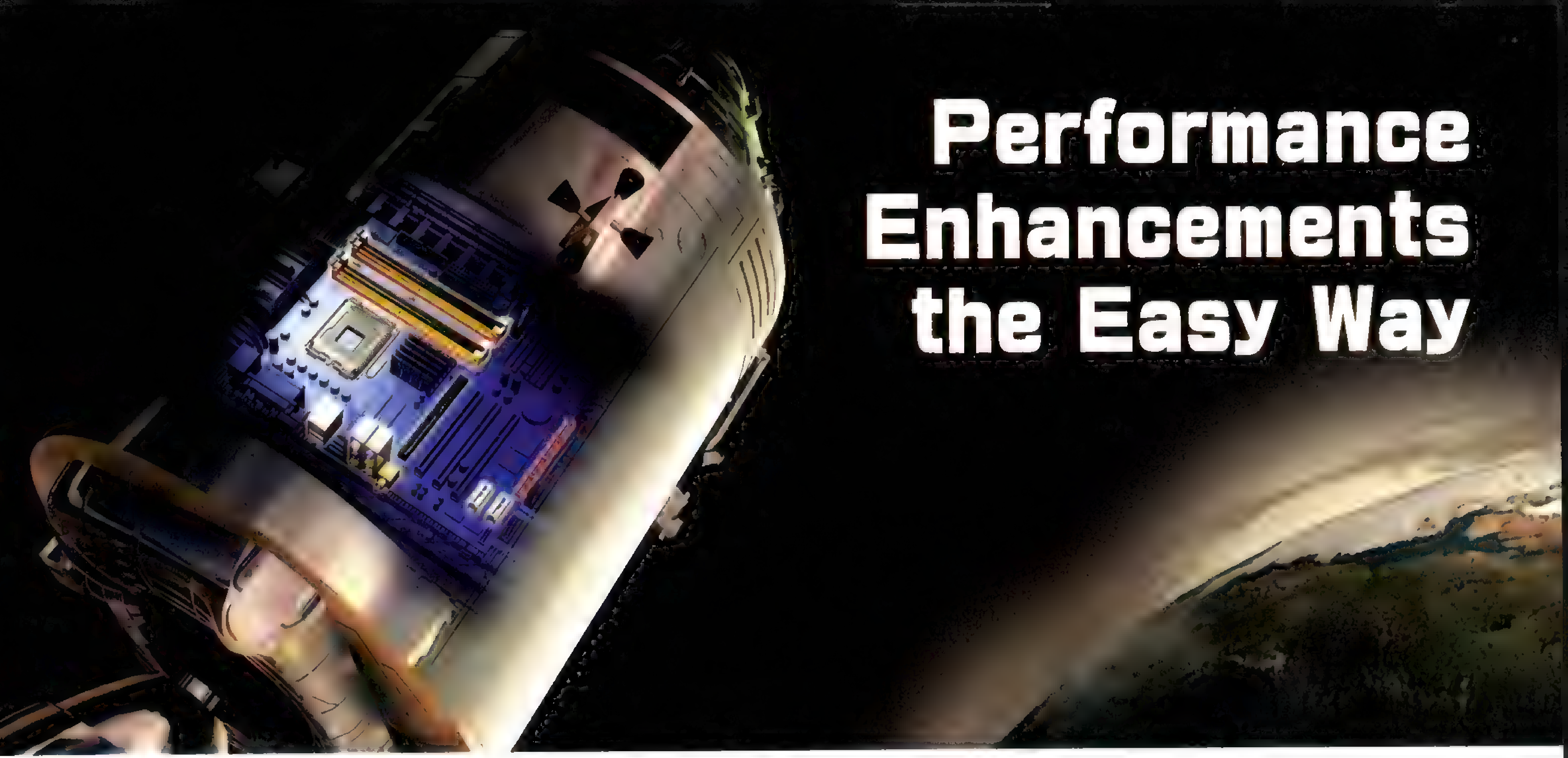




The SPE – An entire computer in itself

cell x-rayed

- Asymmetric multi-core architecture
- 221mm^2 on IBM's 90nm SOI process
- 234 million transistors
- 9 CPUs on one piece of silicon
- Clocked at over 4GHz
- 256GF/s theoretical performance
- 100GB/s of bandwidth
- Arrival in 2006



Performance Enhancements the Easy Way

Overclocking can be considered by some as an art, where experience and much trial and error is necessary to become more proficient in finding out what are the best settings which can bring out the potential of the computer setup in use. ASUS AI Proactive Motherboard Series provides end users with a series of features, which bring flexibility to fine tune your computer for maximum performance even if you don't have intimate knowledge of the overclocking process.

AI NOS™

The patented AI NOS™ (Non-delay Overclocking System) monitors your system load and dynamically boosts performance when running CPU and system intensive tasks. Asus' implementation is based on power consumption. Whenever power consumption spikes due to processors running at full tilt, the AI NOS™ kicks in for an added boost.

Hyper Path2

Whenever you have signals that travel from one point to another on a motherboard, the distance the signals have to travel can often affect stability and performance. The Asus Hyper Path2 technology reduces latency between the CPU and memory on 925X chipsets. This has the benefit of improving on memory performance without sacrificing stability.

PEG Link

PEG Link Mode allows users to raise the GPU and memory throughput from their VGA cards via the motherboards BIOS, thus improving performance on DX8 and DX9 applications. This feature can be enabled from within the BIOS.

DDR2 600

Although Intel's 925X, 915P and 915G chipsets claim to only support DDR2 400/533, ASUS engineers proved otherwise with support for DDR2 600 memory speeds. This helps to eliminate the bottleneck when overclocking both the CPU and memory.

Stack Cool™

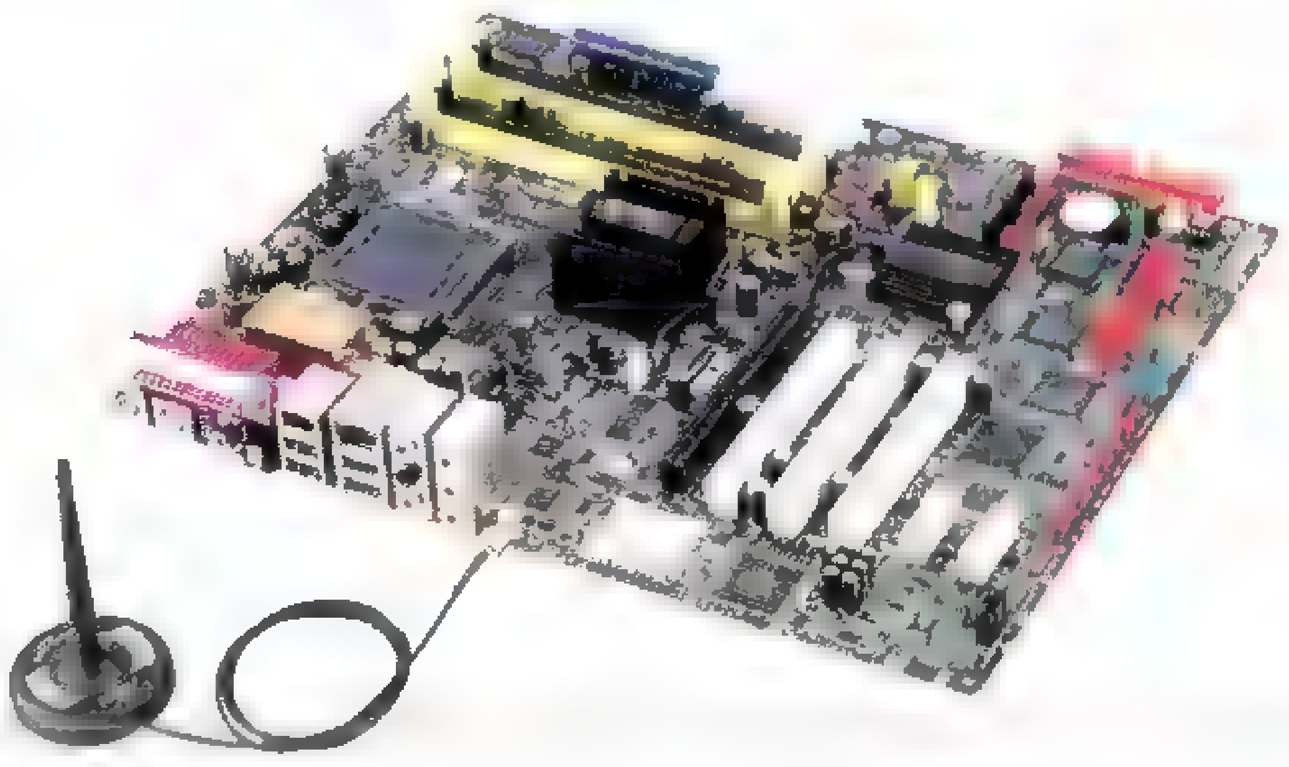
With heat being one of the biggest enemies of overclockers, Asus utilizes a mini-PCB stacked against the main PCB right behind the portion holding the CPU. The mini-PCB helps to draw heat away from components and circuitry, keeping overall temperatures lower for greater stability and longer lifespan.

Wifi-g™

With Wifi-g™ and its one touch setup wizard, Asus keeps setting up your own personal wireless network as easy as snapping your fingers. Compatible with existing 802.11b networks, Wifi-g™ can serve as an access point in your network, or as a wireless adaptor for PCs to access an existing WLAN.

AI NET2

AI NET2 helps improve on your networking experience by taking out all the hassle associated with troubleshooting the failure points in your LAN. The Ai NET2 feature remotely detects the cable connection when you turn on your PC, and reports any faulty connections back up to 100 meters at 1 meter accuracy.



ASUS P5AD2-E Premium

Driven to beastliness

Nathan Davis fiddles with optimised drivers and discusses the issues.

Benchmarking video cards with synthetic tests rather than real-world gameplay has had its fair wad of controversy. The main reason we do these tests, however, is to analyse specific technologies or to see how well a card copes with next-gen demands. Optimised drivers specifically made to bump up these numbers tend to make the process slightly less scientific than desirable. Or do they?

As synthetic testing should, ideally, be an exact comparison, one might view these optimisations as screwing with the results. But direct comparisons are impossible, as they feature different technologies. Why shouldn't these differentiations include driver optimisations? I believe they should, but only if one realises what they're getting into.

As history shows, ATI tends not to fiddle with the quality of filtering techniques, unlike NVIDIA, which just can't seem to help itself. And the proof is in the cheese – in 3DMark05 for example, DST (Depth-Stencil Texture) is enabled by default for NVIDIA cards. This is a jaggy shortcut for creating shadows.

As a quick exercise, I tested a 6800 Ultra with DST both enabled and disabled. The results were as expected, with the non-DST test spitting out 4490 3DMarks – similar to ATI's X800, at 4332 3DMarks, of course without DST. With DST flicked on, the 6800 Ultra rockets to 5133 3DMarks. Obviously NVIDIA is willing to sacrifice detail in order to inflate the numbers.

It's not always about the numbers, but it all stems back to personal preference; whether you desire pixel-perfect frames or feisty-paced action. The choice is yours.

However, just to mess things up, with video decoding, the exact opposite is true. In terms of quality, NVIDIA has the upper hand, thanks to the recent driver-activation of the GeForce 6 PureVideo chips.

Whether or not optimisations are justifiable is a subjective issue. Choice is a wonderful concept – to quasi-quote Bill Hicks, 'You'd be a fool and a communist for thinking otherwise.'

Tell Nathan what you like to drive!
nath@atomicmpc.com.au

hardcorecontents

Tech Trends 28
News on Intel's impending CPU frenzy and NVIDIA's unleashing of serious mobile graphics grunt.

Gearbox 30
Gadgets, widgets and fiddle-things; name them what you will, we have three jam-packed pages of the goodies.

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Framerate 37
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oddware

Phalanges Processor Unit

It'll destroy you, but who cares! Submit to the machine! Set your flippers to auto-pilot!

howwetest

Atomic Labs uses components that are chosen to minimise bottlenecks and satisfy our stringent testing procedures. This can be quite dynamic considering the changing marketplace, however we look for longevity in components. All systems use Windows XP Professional SP1 with DirectX 9.0c alongside the latest drivers. Thanks to ASUS, Western Digital and Altech for supplying our testing components.

Bench boxes

'Gigantor'
CPU: AMD Athlon 64 3200+
Motherboard: ASUS K8V Deluxe

'Peewee'
CPU: Intel Pentium 4 3.6GHz EE
Motherboard: Intel 925XE reference

Shared gear

Video card: ASUS RADEON 9800XT
Hard drives: 36GB Western Digital 10,000rpm Raptor SATA drives
Power supply: Antec TruePower 550W EPS PSU

Benchmarks

AquaMark3
AquaMark3 proves its worth via its Pixel Performance test that benchmarks how many pixels a card can process.

3DMark05 + 3DMark03
3DMark05 and 3DMark03 remain the defintive comparative standard of synethetic game benchmarking.

Far Cry
Far Cry is particularly useful for its extensive and stressful use of vertex and pixel shaders. And it's pretty.

Doom 3
Doom 3 puts the strain on with its broad use of pixel shaders. Its support for 512MB cards provides forward-looking results.

Tech Trends

Bennett Ring reports on Intel's latest offering and the realisation of fast graphics for mobile machines.

Multi-core mayhem

At the recent IDF in San Francisco, Intel finally let the cat out of the bag regarding its new Pentium D processor. The fact that this cat has two heads, yet is often slower at catching mice than a regular, non-mutated cat, didn't seem to bother those who attended.

It hasn't been the world's best kept secret that Intel sees multi-core processors as the solution to the frequency ceiling it looks to have hit in recent years. However, it was only at the latest IDF that solid information was released to the public, but we already knew that the first chip to debut would have not one, but two cores.

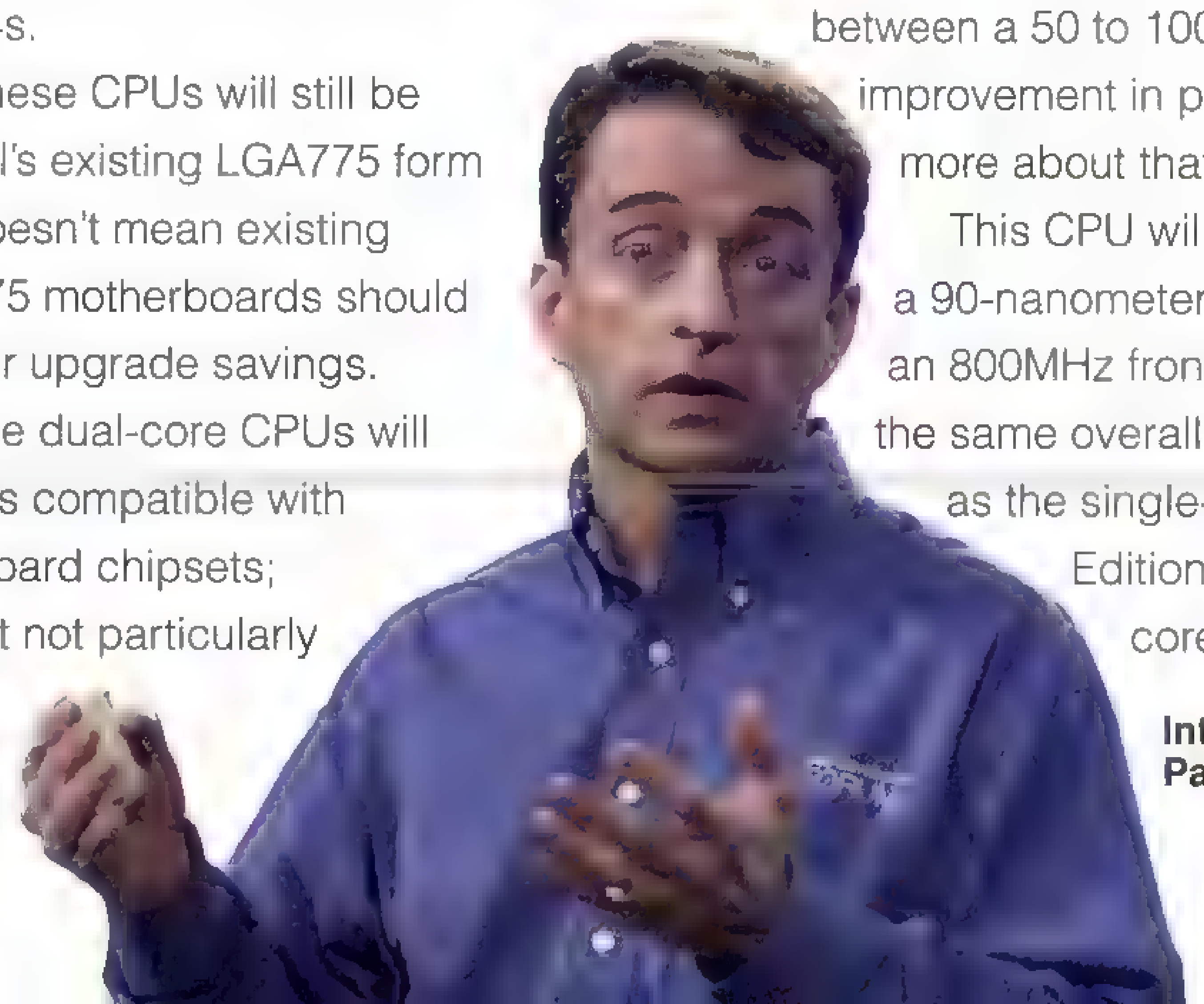
Officially known as the Pentium D, we can expect to see these chips arrive towards the end of the second quarter of 2005. Unfortunately the speed at which the first dual-core chips will run at wasn't revealed, but it has been suggested that initially each core will be clocked at a slower speed than that of today's fastest Pentium 4s.

Surprisingly, these CPUs will still be packaged in Intel's existing LGA775 form factor, but this doesn't mean existing owners of LGA775 motherboards should start blowing their upgrade savings. It appears that the dual-core CPUs will not be backwards compatible with existing motherboard chipsets; disappointing but not particularly surprising considering Intel's history of major changes to its platforms. Instead, two new chipsets will be introduced to support the Pentium D. At the low end we'll have the Intel 945 Express chipset to cater to the needs of the standard Pentium D. A higher end chipset known as the 955X will be the premium platform for the Extreme Edition of the Pentium D, of which the first is the Pentium 4 EE 840. Unlike the Pentium D, frequency details of the debut dual-core Extreme Edition were more forthcoming.

Both cores in the EE are clocked at 3.2GHz, which is noticeably slower than the 3.73GHz Extreme Edition that is already available. However, benchmarks of multithreaded applications show anything between a 50 to 100 percent improvement in performance… but more about that later.

This CPU will be fabricated on a 90-nanometer process, and uses an 800MHz frontside bus. It has the same overall amount of cache as the single-core Extreme Edition, at 2MB, with each core assigned 1MB. The transistor count is 230 million, which is unexpectedly close to the transistor count of today's single-core EE CPU. The Pentium D is also a 230 million transistor behemoth, with an identical cache configuration, but it will not support HyperThreading. Both chips include 64-bit capability.

It all sounds exciting, until you realise that these systems will operate much like the multi-processor systems we have today – without multithreaded or optimised software there is no performance increase. Multitasking will receive a massive shot in the arm, but gaming performance is likely to be worse than the high end CPUs of today, due to the lower core frequency. It's only when software that has been developed with multithreading in mind becomes popular that the true benefit of Intel's multi-cored approach will become apparent.



Intel's senior vice president Patrick Gelsinger.

NVIDIA on the Go

NVIDIA recently announced a chipset that will have desktop haters stroking their laptops with glee. The GeForce Go 6800 Ultra has finally arrived, and it promises performance that will make most desktops green with envy.

Even though it has a very similar product name to the GeForce 6800 Ultra, the Go isn't quite the speed demon that its bigger brother is. The major difference is a lowering of total pixel pipelines from 16 down to 12, but it is still based on the 6800 architecture. As such, it also uses the full 256-bit memory bus of the desktop Ultra, which is paired up with 256MB of DDR3 memory clocked at 550MHz (1100MHz effective). This results in a total memory bandwidth of 35.2GB/s, a figure that is simply unheard of in a laptop solution. The GPU core runs at a healthy 450MHz, and it's all packaged on a mobile PCI Express module (MXM).

NVIDIA
GeForce Go
6 Series

It's not the coolest video solution around though, and is therefore only suitable for desktop replacement laptops. NVIDIA hasn't made the thermal output clear, but systems running this chipset along with a 2GHz Pentium-M have a total thermal output of around 65W, which is very warm for a laptop. Dell is one of the first system manufacturers to use this chipset, including it in the Dell XPS 2 laptop.

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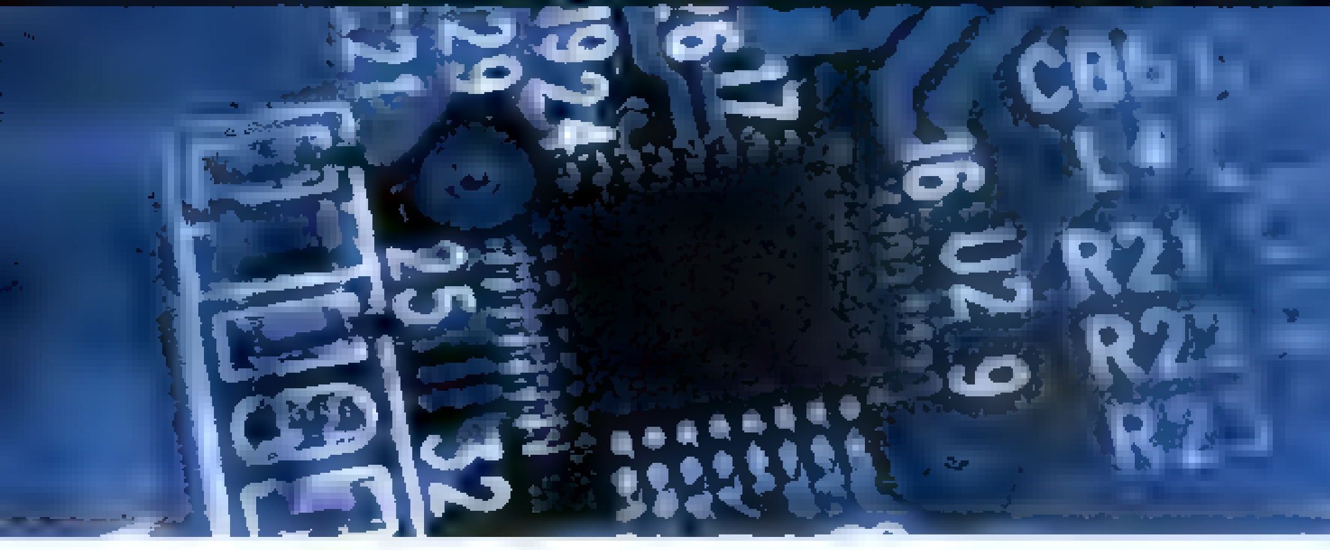


Matias Laptop Armour

Supplier Alienware
Website www.alienwaresystems.com.au
Price $299

This armour-clad carrier is an attractive black notebook carrier with much padding inside. It was designed, apparently, to protect a notebook from drops of up to three metres. We tend not to look at a whole lot of notebooks, but we still had the powerful Alienware Area-51m 7700 handy from last month. The thing is, the same people that sell this carry case insisted we didn't *test it with their baby*. Interesting.

USB Smart Cable

Supplier Anyware
Website www.anyware.com.au **Price** $19.95

In a world where USB isn't wireless, this two-metre USB extension cable is an ingenious solution to seeing exactly what speed your USB widgets are operating at. At the male end of the cable, there are two LEDs – red and blue. Together they signify the speeds – when blue, you're speeding along at USB 2.0 and when red it's riding a USB ferry at either 1.0 or 1.1. When purple, there's data transference over the older USB lines. A simplistic yet spiffy USB gizmo.

Forever Flashlight

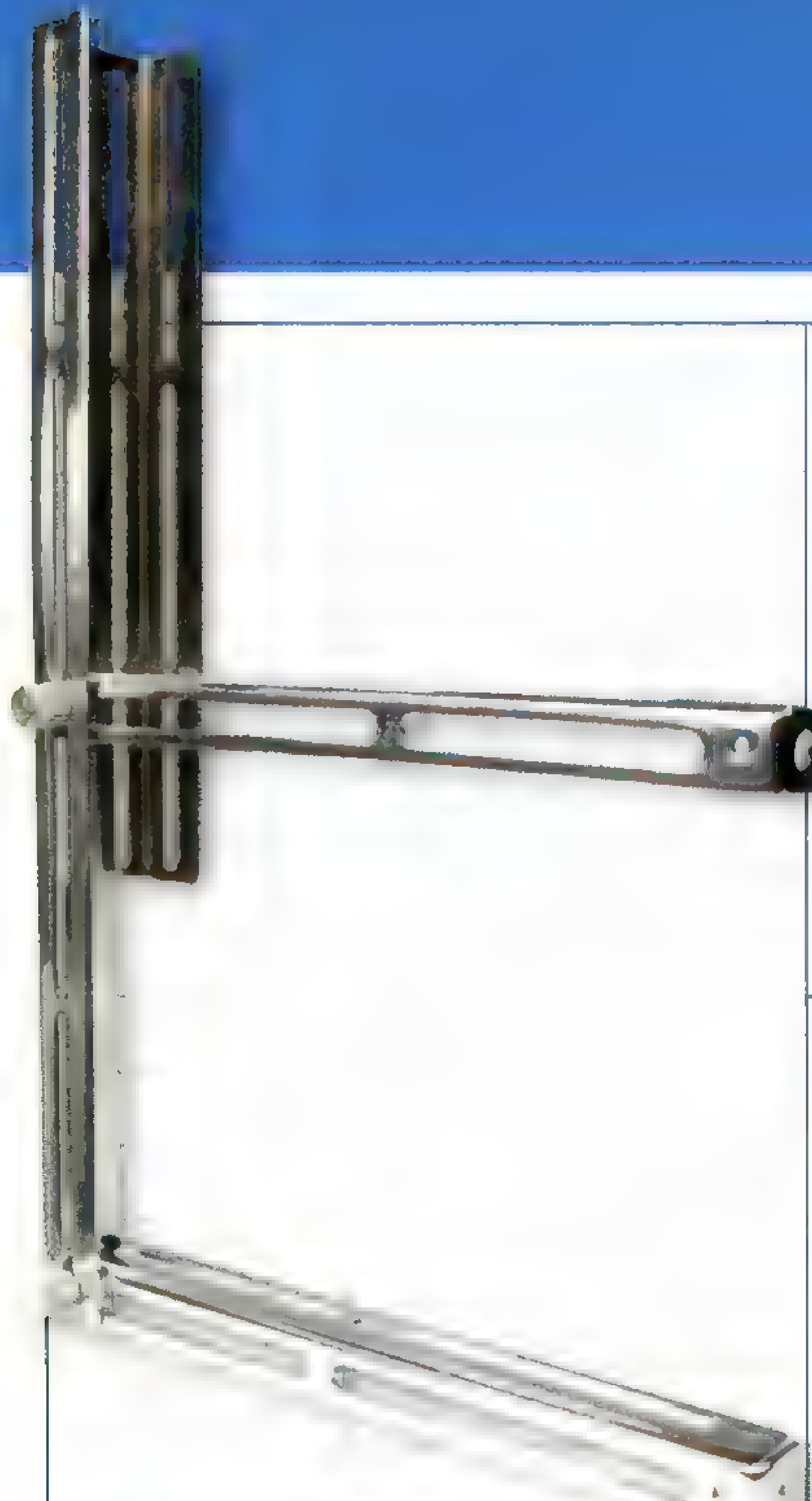
Supplier Jaycar Electronics
Website www.jaycar.com.au **Price** $24.95

What does a microphone and this have in common? Nothing. Hah; we lie. They both use the law of magnetic induction, technically known as Faraday's Law. Basically this law dictates when there's a changing magnetic field near a coil of wires, an electrical charge is invoked in said coil. That's exactly how this surprisingly effective battery-less LED flashlight works. Thirty-seconds of shaking will get you about five minutes of a well-lit focal point. Grab one of these and work up the juice to build up those special wrist muscles.

Tiger TV Mission Paintball

Supplier Hasbro
Website www.missionpaintballgame.com
Price $69.95

If you're so post-modern that you like simulations of simulations, this battery-powered console is for you. With a video and a monophonic audio line-out, you can easily jack this paintball gun look-a-like into your telly and start pretending. An isometric-based game, this would have been a hit some years ago. What really awakens the Bullock's Factor, however, is the tedious menu system, which requires you to shoot at everything. It's no Wil Wright opus, but if you're too chicken to play real paintball, you could try this.



Acer PD113

Supplier: Acer **Website:** www.acer.com.au **Price:** $1799

Packing a feisty 2000:1 contrast ratio, the benefits of DLP projectors are obvious – as is the moolah rating. With a native resolution of 800 x 600, it's fit for the basic home theatre setup that yearns for a big-arsed-screen. One problem inherent with the DLP mirror design is the rainbow effect, whereby one moves their eyes around and the colours separate – though some people are more susceptible to this than others. Overall, it's a great low-end projector and at 1600 ANSI lumens, acceptable for low-lit rooms. Scorch envy holes in your friends' pupils.

Wherever PCI Rack

Supplier
XCOM Technology
Website
www.xcom.com.au
Price $19

As plain as this rig of metal may appear, it's a set of brackets that could be useful to those after a little less chaos in the case. The thing is, you'll need plenty of free expansion slots that you don't plan on using. If this is the situation, with this resizable bracket kit, you can install additional hard drives, fans, radiators, reservoirs or anything that requires brackets in the space one usually wouldn't. The product claims you can even install a second motherboard, though we doubt its stability.

Tundra Single 5.25in Bay Reservoir

Supplier PC Case Gear
Website
www.pccasegear.com.au
Price $54

Available in UV green and UV blue, this water reservoir cleverly screws into place in a 5.25in drive bay. Even if you just like storing water in your system for the sake of it, because *you're totally on the edge*, this UV reactive water chamber will certainly do some justice in the holding of said liquid. If you have some UV reactive LEDs handy, there are four 3mm mounts to pop these into, so, though pricey, it can really pack a trippy glow.

Plantronics GameCom 1

Supplier Anyware
Website www.anyware.com.au
Price $69.95

Another headset we've come across, and this one tends to pick up a lot of static and other miscellaneous sounds one might not normally hear. We were promised this was due to its high-quality build. Whether or not the ability to pick up so much noise is a great thing is certainly subjective, but apart from that, it's comfortable and has an otherwise solid name behind it. There's also a USB version available for those who don't have easy access to a sound card.

Extreme Gamer Quantum case

Supplier Universal Enterprise
Website www.universalenterprise.com.au **Price** $220

Quantum computers aren't quite ready for the consumer market, considering the necessity for near zero-Kelvin operating temperatures. But you might otherwise fool your friends with this. Kickin' it HAL 9000-subwoofer-style, this box would make a slick sidekick with a front blue LCD readout for temps, time and controlling fans; screwless everything and five 3.5in and five 5.25in expansion bays. The side panel however doesn't come off as you might expect. If *they* do figure it, they'll be sucked into oblivion with the possible six dust-filtering case fans. It's a plethora of deliciousness – all it needs is a PSU.

Icemat Siberia Multi Headset

Supplier Icemat **Website** www.icemat.com **Price** US$79

Though kicking it somewhat bizarre-style on many human heads, this mostly white-coloured headset is one incredible sounding set for the first such device for Icemat to develop. With ranges of 18Hz to 28kHz, it picks up and spits out all possible sounds in pure glory – no hisses here. Cleverly, the microphone was made to be a shirt clip as opposed to the standard mouth extension, so it can be placed wherever one might fancy a mic. Like your ear!

BatteryLife Activator

Supplier ALEMAX Importers
Website www.batterylife.com.au **Price** $30

We've seen our fair share of crazy components, but this is one of the rare gems. It's a sticker that claims to increase the battery power held in a mobile phone by up to 30% and decrease charge time by 40%. Something to do with re-focussing fragmented ions. This is a high claim for a sticker, alas unsurprisingly, after having radio on the loud speaker for 9 hours, it didn't have a vaguely measureable benefit to the life-span or the 1 hour charge time of our test subject. Sticky shenanigans.

ACE CAD DigiMemo A501

Supplier Capax Technology
Website www.capaxtech.com.au **Price** $169

PC tablets can be kinda cool, but they aren't as natural as a pen and paper. Hence ACE CAD has released the DigiMemo. It uses an electronic ink pen to replicate your doodling on a magnetic plate tucked underneath the real paper pad. It then connects via USB to upload the image files to your PC. There are some general issues – it doesn't always reproduce lighter strokes and the software's not intuitive – but in the end it's a fun and cool-looking device.

If you're serious about gaming you should be wearing one of these!

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Pentium 4 650 (3.4GHz, 800fsb, 2MB)	610
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Silicone heaven

No thermal paste is safe when **Bennett Ring** is around. We put five to the test.

If you're into performance computing, a major hair-pulling issue is heat, especially in Australia's steamy climate. A speedy CPU is a hot CPU, and sometimes the only difference between a stable PC and a machine that BSODs within seconds of booting up is a couple of degrees. While the obvious solution is a behemoth of a heatsink and more case fans than a wind farm, there's one important ingredient to CPU cooling that is often overlooked. Without decent thermal paste bonding your CPU to the heatsink, it doesn't matter whether you have a 30,000rpm fan hooked up to the most thermally efficient copper heatsink on the planet – things are going to get toasty.

Even if you've polished your heatsink so much that it doubles as a handy shaving mirror, at the microscopic level it will still look more like the Grand Canyon than the Nullabor Plain. It's a mish-mash of miniature trenches and valleys, and the CPU heat spreader is likely to be even worse. When these two surfaces are placed together the gaps between the two fill with air, and air doesn't happen to be a very effective conductor of heat when there's so much of it being generated.

It's the task of thermal paste to fill these minute gaps, and thus make the transferral of heat from the CPU to the heatsink much more efficient. Therefore a high performing thermal paste is made from the most thermally conductive material possible, and the current favourite ingredient is silver.

While gold would be a more effective ingredient, it's simply not affordable. One of the first silver pastes to hit the market was the venerable Arctic Silver, and this had a silver content of up to 80 percent of the net weight. Back when Arctic Silver first entered the scene, it offered a massive improvement over the generic goo that shipped with most heatsinks, beating the competition by up to 10°C. However, other manufacturers have since wisened up to the fact that silver isn't just good for ladies jewellery, and there are now several copycat products all based around silver. So we thought it was time to drag Chernobyl out from its packing crate, and put some of these pastes to the test.

How we tested

Before moving on to the test results, we should talk about the best way to install thermal paste. Prior to applying the paste give both the CPU and heatsink a good clean – Zippo lighter fluid does the trick for those on a tight budget. Once both surfaces are clean it's tempting to smooth as much paste over your CPU and then just plonk your heatsink on top of this sloppy mess, but this will actually have a detrimental effect, creating more of a barrier between the CPU and heatsink.

It's only necessary to fill the microscopic gaps on both surfaces, so only a very small amount is needed. I always put just a small dob of paste on the heatsink, and then use a business card to smooth the paste layer out so that it's almost transparent. You don't need to cover the entire surface of the heatsink either; just enough to cover the CPU heat spreader should do the job. Then place the heatsink straight down onto the CPU – try not so slide it around too much as this may ruin your even distribution of paste.

Now that you know the best way to apply thermal paste, it's time to see how the various contenders stack up. To test these pastes we set Chernobyl to output 80W of heat, which is a fairly realistic temperature for the average CPU. A Gigabyte 3D Cooler heatsink was used for the tests, and each paste was left in place for around 20 minutes – the CPU temperature stabilised after a mere 10 minutes Most pastes will work more effectively after a couple of days as they settle into the gaps, but time constraints meant that we didn't have the luxury of leaving each paste in place for this period of time. Ambient room temperature was a constant, if somewhat warm, 27°C.

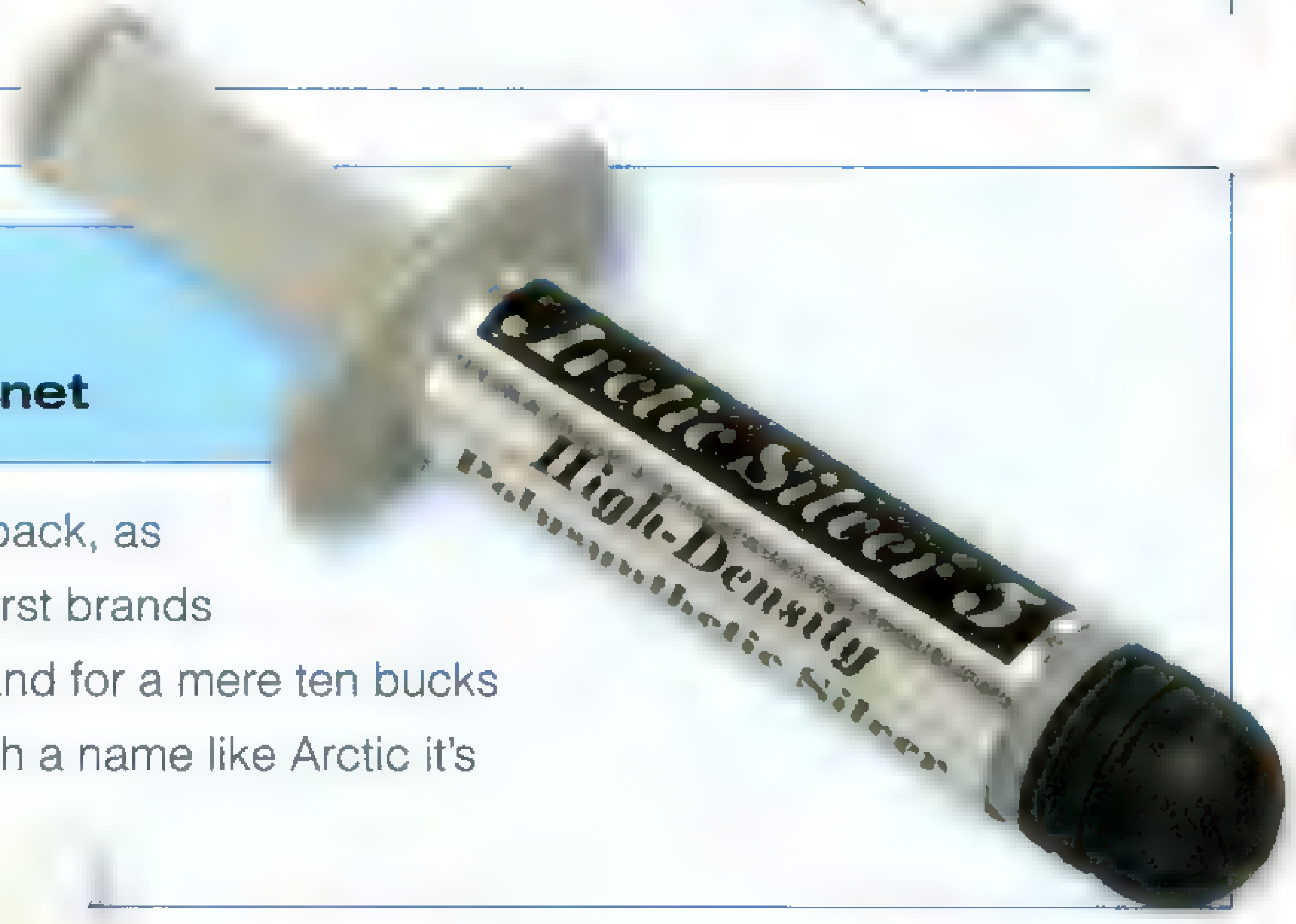
Antec Formula 5

Temperature **45°C** Supplier **Below Zero** Website **www.below-0.net**

There's a reason this stuff performs identically to Arctic Silver 5 – it is Arctic Silver 5! Like most Antec products, this paste isn't actually manufactured by Antec. It simply buys the paste of Arctic Silver and repackages it as Antec Formula 5. The only difference, other than the name, is the packaging – as you can see from the product photos. Regardless, either will do the job just as well – so we recommend you go ahead and purchase whichever one is cheapest.

Arctic Silver 5

Temperature **45°C** Supplier **Below Zero** Website **www.below-0.net**



Not only is this the equal best performer, it's also very easy to apply. It has the consistency of slightly gluggy toothpaste, as opposed to the thick, sticky pastes that didn't perform quite as well, such as the Thermalright at the bottom of the page. It's no surprise to see that it came out at the top of the pack, as Arctic Silver was one of the first brands of premium heatsink paste, and for a mere ten bucks it's highly recommended. With a name like Arctic it's hard to go wrong.

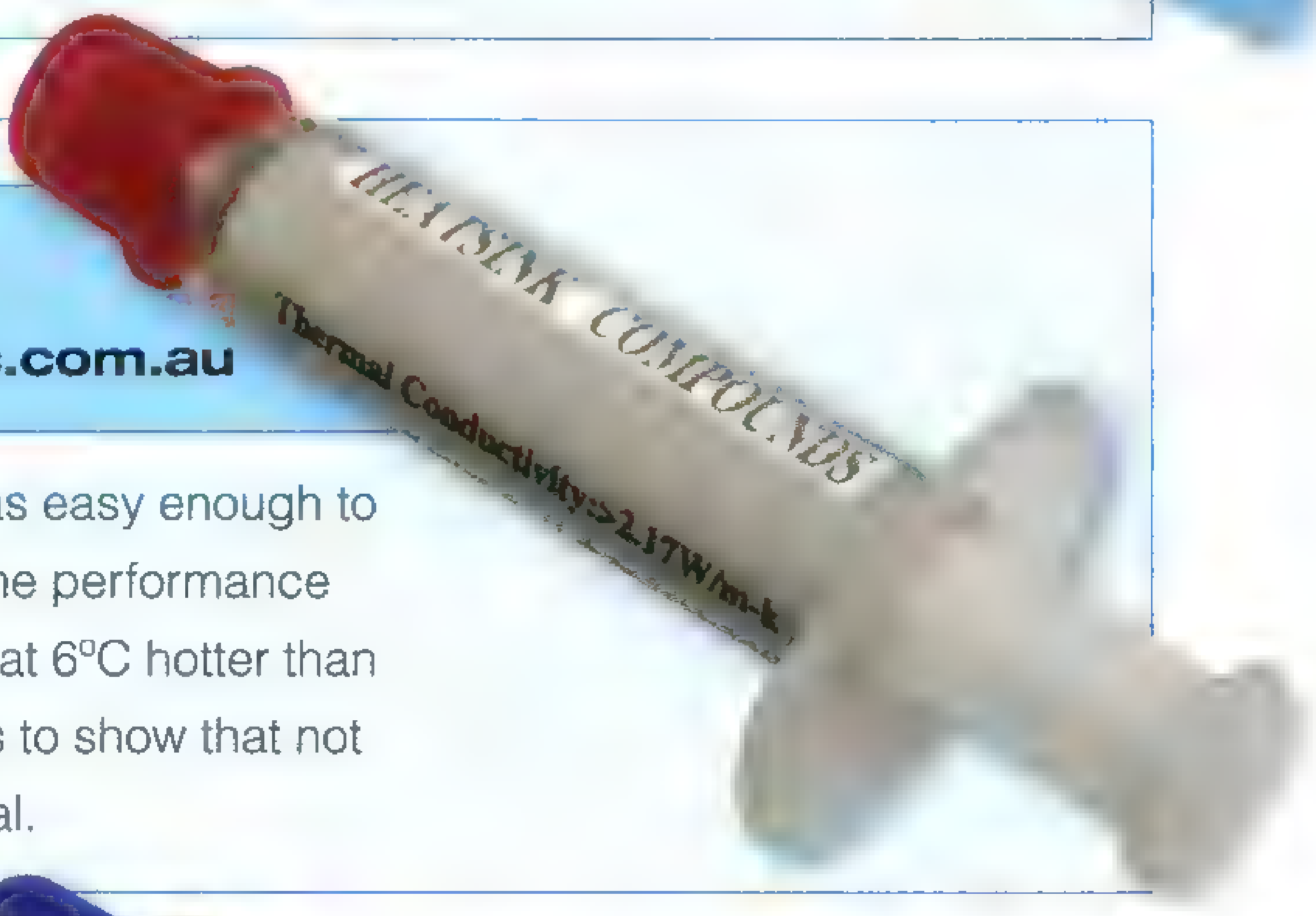
Cooler Master Premium

Temperature **45°C** Supplier **Rectron** Website **www.rectron.com.au**

We're not sure what the main ingredient of this paste is, but it doesn't appear to be silver. This hasn't hurt its performance though, as the Premium paste managed to equal both Arctic Silver 5 and Antec Formula 5, peaking at 45°C. It has the best bundle of the lot, with a plastic card for spreading the paste as well as templates to ensure you only cover the correct area of the heatsink. This makes it pretty idiot-proof so, if you manage to get paste all over your motherboard, you'll only have yourself to blame.

Spire Fanner Heatsink Compound

Temperature **51°C** Supplier **Low Noise PC** Website **www.lownoisepc.com.au**



Until we tested this paste, it looked like this was going to be the world's most boring Head to Head, as the three prior samples had all performed identically, reaching a peak temperature of 45°C. However, within minutes it was obvious that this paste wasn't going to offer any competition. Sure, it was easy enough to spread out over the heatsink, but the performance was noticeably worse, topping out at 6°C hotter than the leaders of the pack. It just goes to show that not all thermal pastes are created equal.

Thermalright

Temperature **47°C** Supplier **PC Cooling Australia** Website **www.pcca.com.au**

You might not think that it's tricky to smear a bit of paste over your CPU, but when it's as thick as the Thermalright paste you'll soon change your mind. Unlike the other pastes, which had a nice smooth consistency, the Thermalright paste was very gluggy, making it difficult to cover the base of the heatsink evenly. Obviously this didn't hurt performance too much, but it was still a few degrees shy of the leaders. And, of course, it's better than the Spire Fanner Heatsink Compound above.

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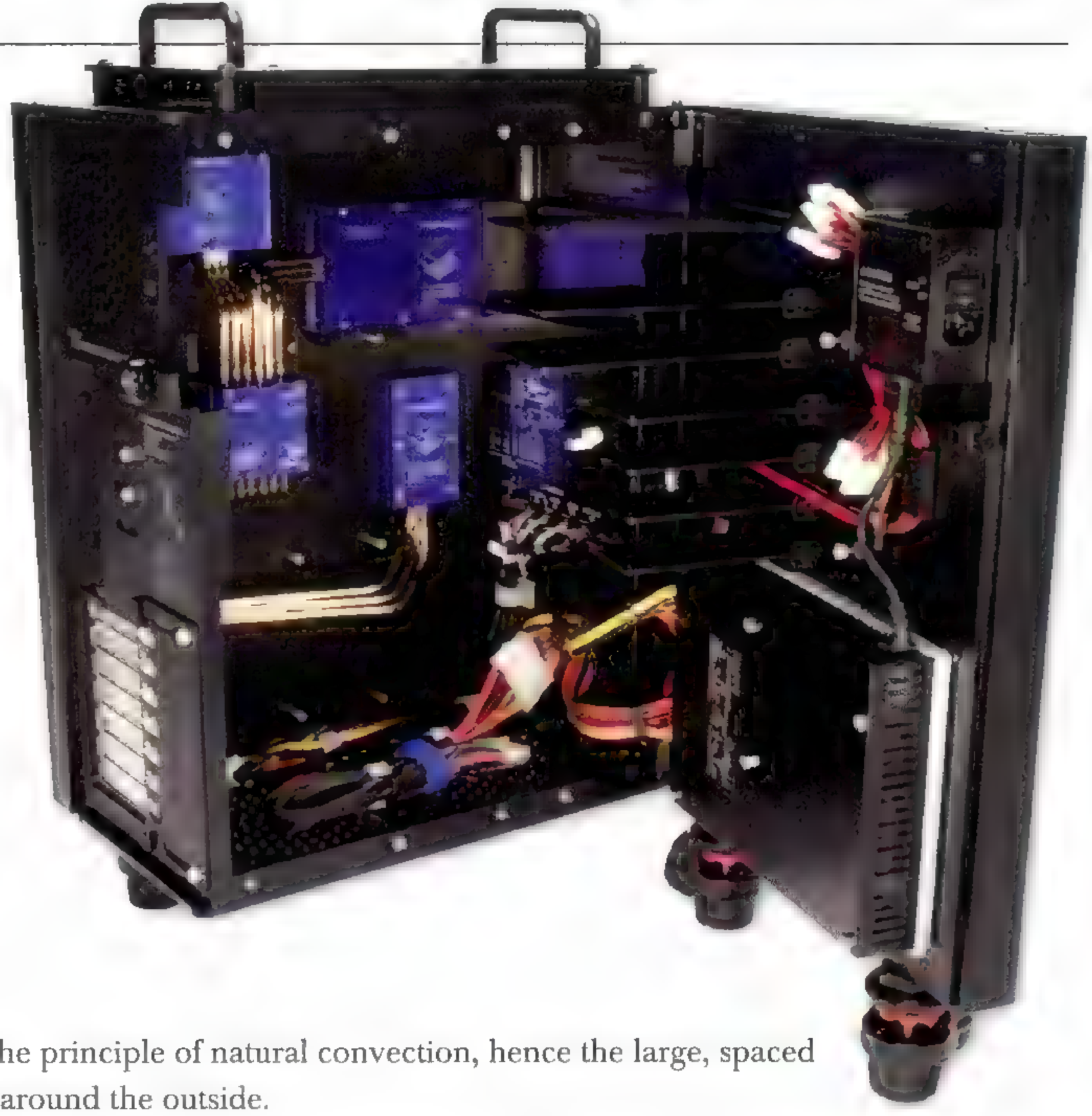
Totally No Noise 500AF



When it comes to computing, we know silence is golden, which is why we aren't keeping quiet about the next big thing in computer casing – the Zalman Totally No Noise 500AF, the very best in silent cooling for high performance systems.

At Zalman we understand that silent operation has grown to become a major driving force behind your upgrade decisions, and for good reason. Why install that surround sound when you can hardly enjoy it with a case blasting away like a paper mill?

The arrival of the Zalman Totally No Noise 500AF means slow, under-performing silent systems are a thing of the past. The enthusiast silent cooling audience finally has a silent, high-end option.

SILENT TECHNOLOGY

All components within our case are cooled via a sexy array of heatpipes which connect to the exterior. For dissipation, the case itself is the heatsink and it relies on the principle of natural convection, hence the large, spaced fins around the outside.

Packed with an IR remote and receiver, the 500AF also has an appeal to the home theatre market. Pushing the envelope, this case allows the use of high-end gaming hardware in a truly silent system, such as a Home Theatre PC.

With a passively cooled power supply, cooling blocks each for the CPU, the video card GPU and motherboard chipset, you can finally and completely do away with fan noise.

Inside, alongside the LED lamp (for the many moments of fiddling inside), there is more than ample room for hard drives and optical drives, with three 5.25 inch bays and four 3.5 inch bays. Powering all this is a 400W passively cooled PSU, which also sports the new 24-pin ATX motherboard connector. The TNN 500AF case also comes with a HDD cooling rack designed out of heatpipes and made specifically to remove heat from the heated, high-performance HDDs.

It's a lot of technology to pack in, which is why the Zalman weighs around 35 kilograms but don't worry, we've attached wheels for ease of transportation. In keeping with our keen attention to detail, the wheels also have rubber casters which drop down for the *rare* occasion that the case is stationary. There are also two sturdy carry handles on top which fold neatly away.

So, hopefully, now the message is loud and clear: No other case currently has all the benefits of the Zalman Totally No Noise 500AF. Why skimp on a high performing machine because of noise or heat issues?

WINNER

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Nathan Davis
Atomic Hardware Writer

hotaward

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Framerate

Nathan Davis burrows through the cards that draw the pretty pictures.

Gigabyte RADEON X850 XT PE

GPU **ATI RADEON X850 XT PE (R480)**
Memory size **256MB**
Core clock **540MHz**
Effective memory clock **1180MHz**
Memory type **256-bit GDDR3; 1.6ns BGA**
Pixel pipelines **16**
Vertex shaders **6**
Video in **Composite; S-Video**
Video out **DVI; D-Sub adaptors; component; composite; S-Video**
Price **$990**
Supplier **Synnex**
Website **www.synnex.com.au**

Sporting one of ATI's largest heatsink/cooler designs to date, this card also packs the most powerful Shader Model 2.0b chip available. Displaying current tech at faster and better speeds than being future-proofed is probably why this card manages to floor the competition. It even comes with a copy of Joint Operations: Typhoon Rising. It's also quiet, handles high levels of heat well and is the fastest card on the market.

ASUS Extreme N6800GT

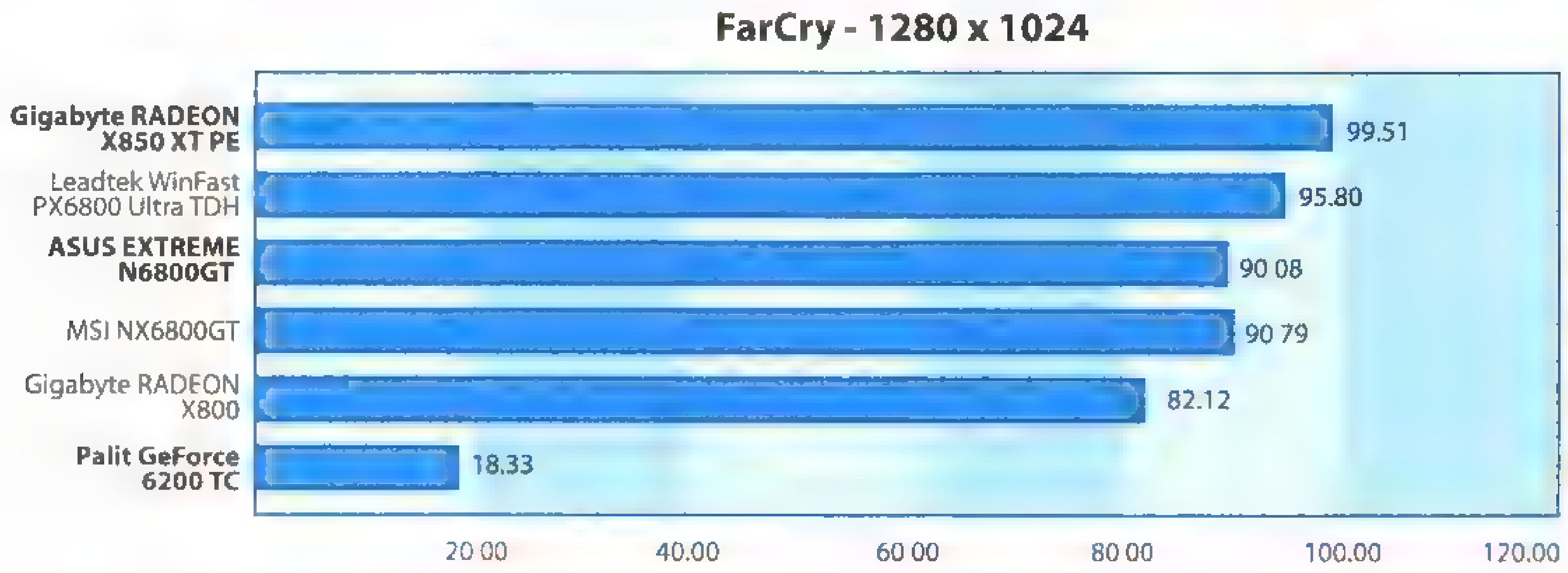
GPU **NVIDIA GeForce 6800GT (NV45)**
Memory size **256MB**
Core clock **350MHz**
Effective memory clock **1000MHz**
Memory type **256-bit GDDR3; 2ns BGA**
Pixel pipelines **16**
Vertex shaders **6**
Video in **None**
Video out **DVI; D-Sub adaptors; composite**
Price **$899**
Supplier **ASUS**
Website **www.asus.com.tw**

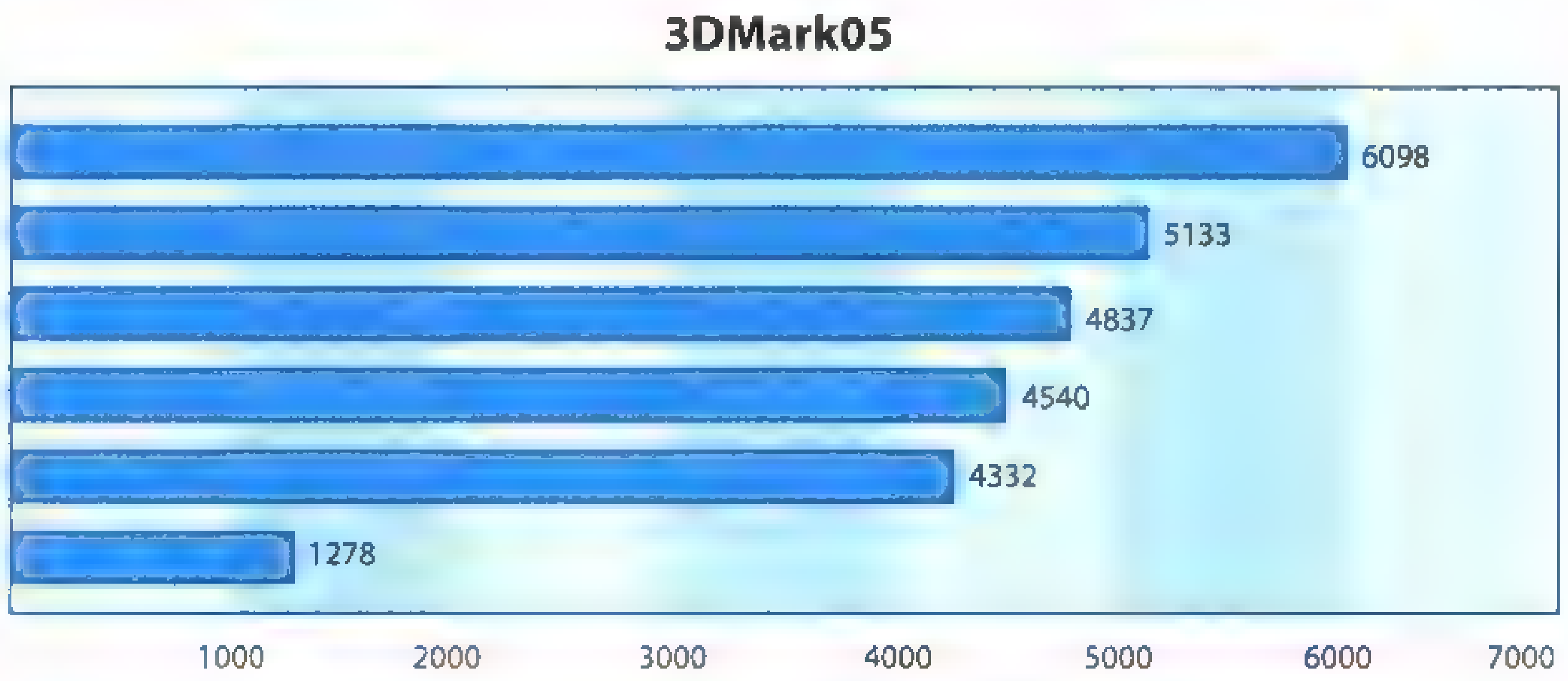
Even with ATI's recent slam dunk with the X850, this remains a decent card. The cooling is slightly louder than the X850 next door, however it is cooler. In fact, the only part on this that might want to burn a crinkle in you is the MOSFET cooler, which is for the most part passive. If you're lucky enough to have an SLI motherboard, and another of this exact card, you'll be surfing the high waves.

Palit GeForce 6200 TC

GPU **NVIDIA GeForce 6200 TurboCache**
Memory size **64MB**
Core clock **350MHz**
Effective memory clock **600MHz**
Memory type **32-bit DDR**
Pixel pipelines **4**
Vertex shaders **3**
Video in **None**
Video out **D-Sub; DVI; component; composite; S-Video**
Price **$TBA**
Supplier **NVIDIA**
Website **www.nvidia.com**

Obviously not the fastest card we've looked at, this is exactly what you would want for a home theatre setup, particularly with its component-out support. This passively cooled TurboCache card is a 256MB version with 64MB on-board, so it steals 192MB of system RAM. Capable of calculating most 3D tasks without a hassle and equipped with NVIDIA's now-activated PureVideo chip, it couldn't be more ideal for the lounge.





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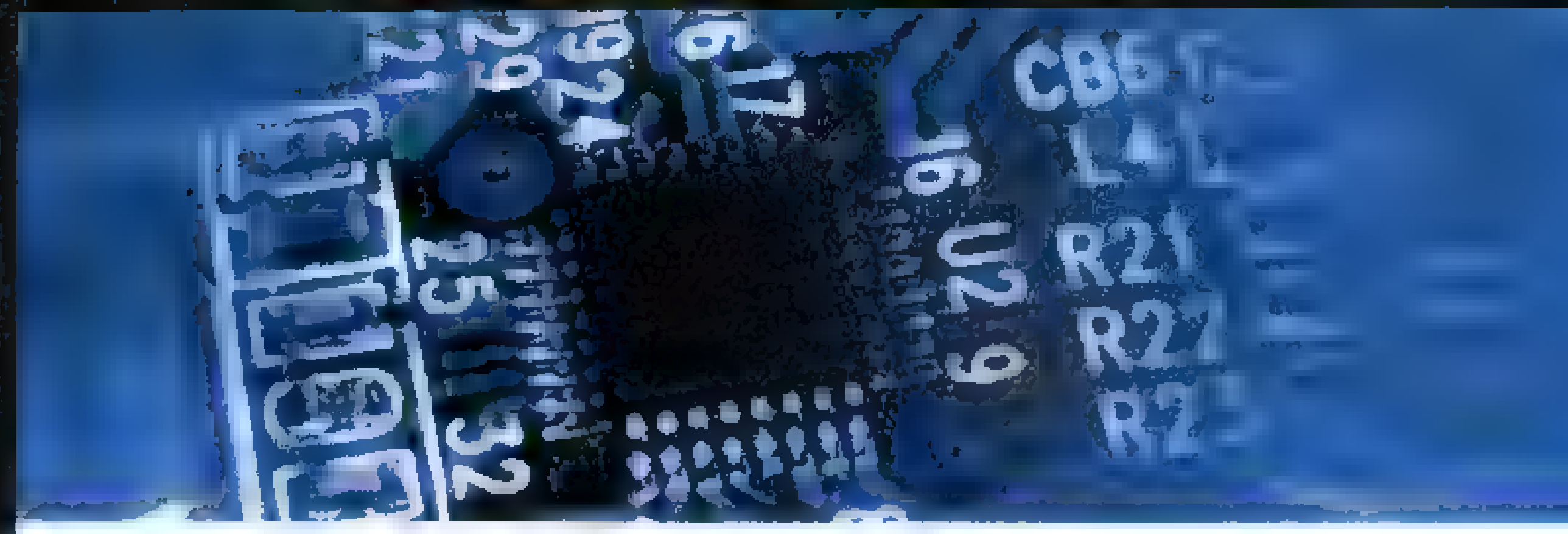
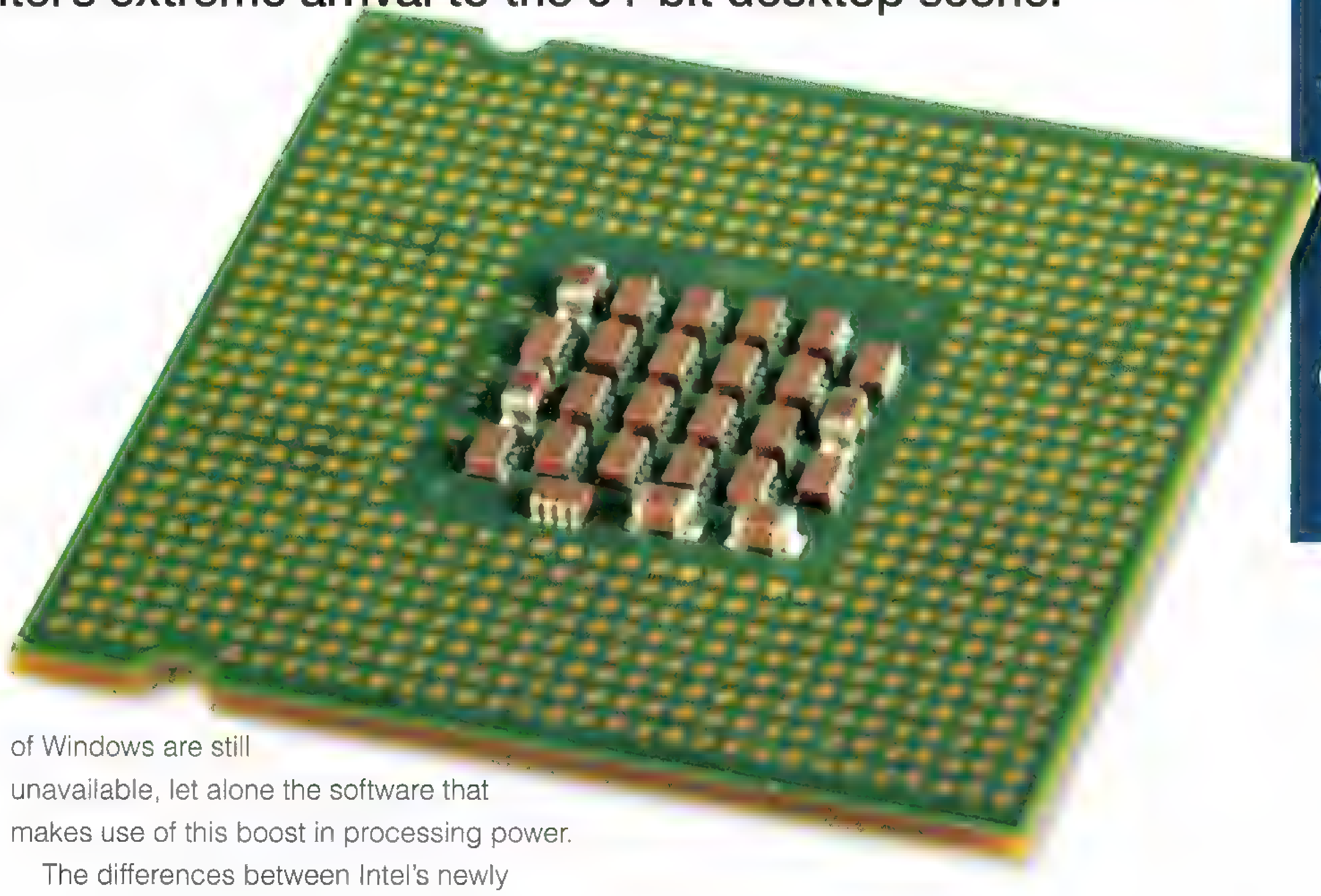


Intel Pentium 4 3.73GHz Extreme Edition

Nathan Davis checks out Intel's extreme arrival to the 64-bit desktop scene.

specs

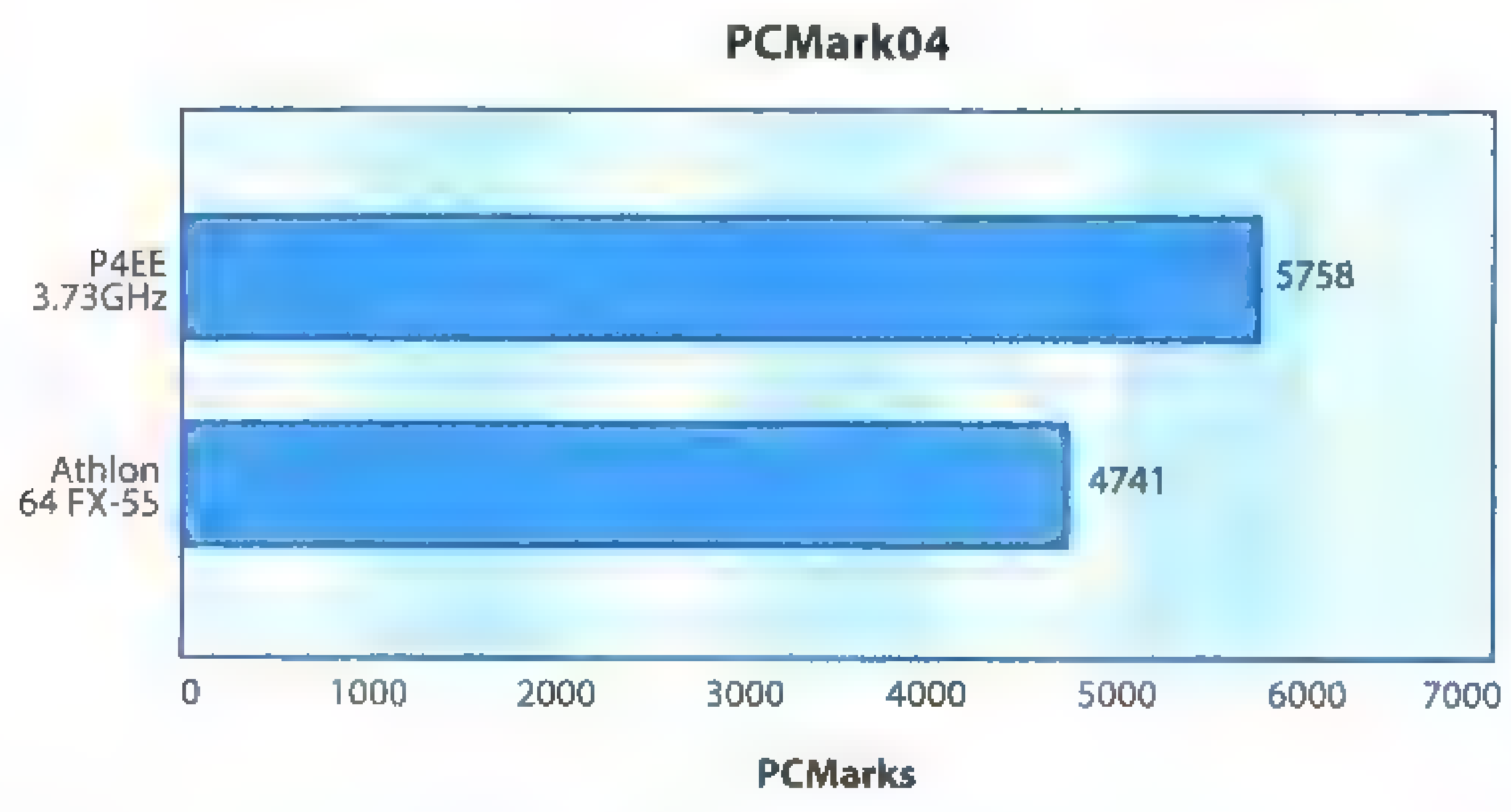
Price **US$999**
Supplier **Intel**
Website **www.intel.com.au**
Specifications **Intel Pentium 4 Extreme Edition 3.73GHz; Socket 775; Extended Memory 64-bit technology architecture; .09-micron fabrication process; 2MB L2 cache; 1066MHz FSB; 115W thermal power rating.**

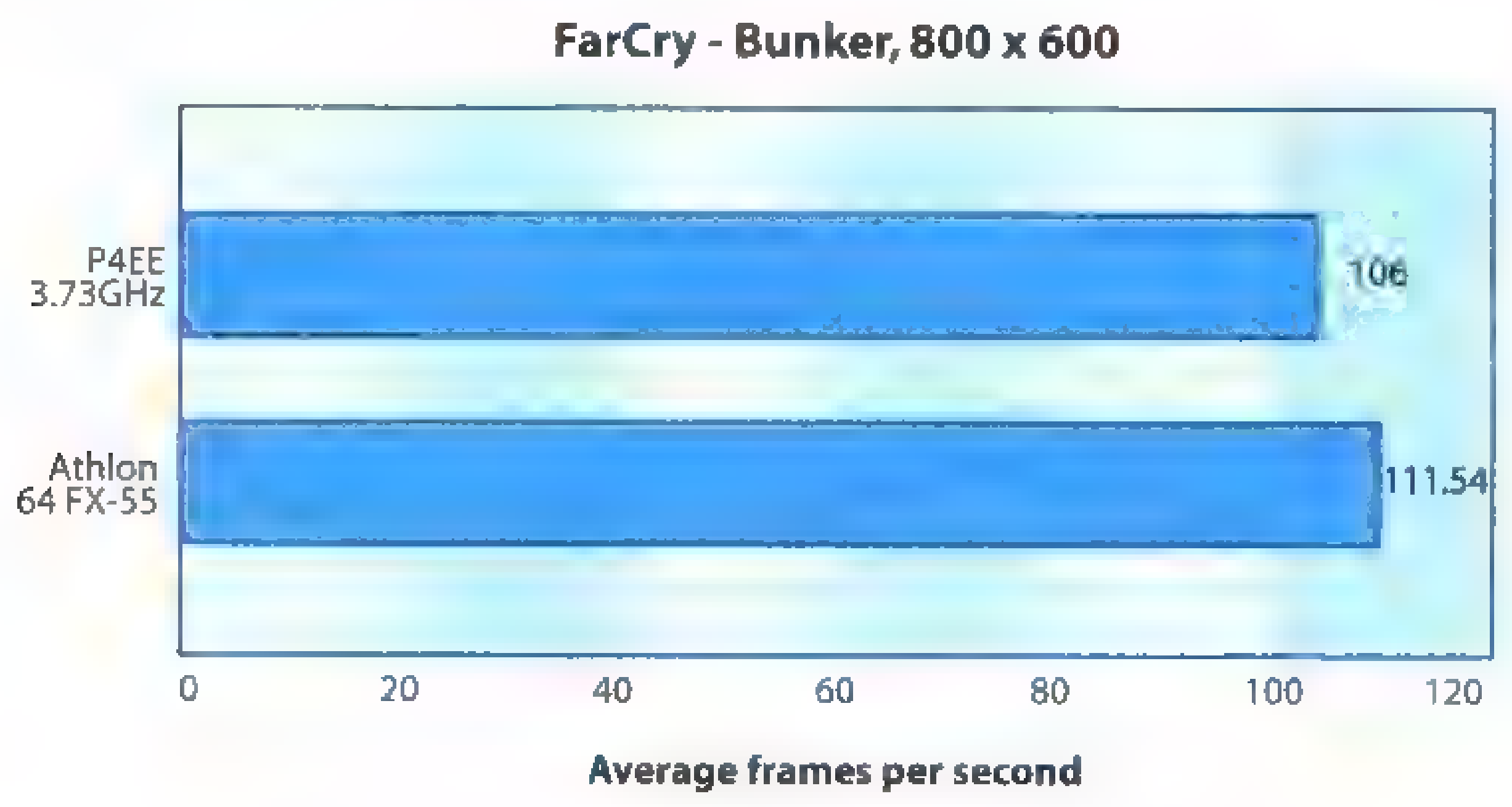


Having suggested that 64-bit desktop CPUs were not in the pipeline, Intel apparently changed its mind and decided to play ball. This came as no surprise, considering the popularity of AMD's 64-bit desktop offering. With the move away from raw megahertz as the driving force behind a processor and more focus on features, Intel's move to desktop 64-bit availability is more evolutionary than revolutionary.

Extended Memory 64-bit Technology (EM64T) is Intel's rendition of AMD's x86-64 architecture and is almost a complete replica. Ironic, but this is damn good news for everyone involved, with wide-scale compatibility and far easier implementation of 64-bit on the desktop. EM64T existed on previous 90nm Intel CPUs, but it wasn't enabled as it likely hadn't yet been perfected. In terms of memory addressing, the theoretical maximum size for 64-bit CPUs rockets to 16 billion gigabytes (16 exabytes). Apologies if I invoked the *Kleenex Factor*.

It was late 2003 when we first saw the original 64-bit desktop CPU from AMD. Today the situation is much the same in regards to 64-bit optimised programs. Though apparently just around the corner, 64-bit desktop copies of Windows are still unavailable, let alone the software that makes use of this boost in processing power.





The differences between Intel's newly released 600 series and the new P4 Extreme Edition were the 600's Enhanced Intel SpeedStep Technology (EIST) and the P4EE's 1066MHz FSB, so we checked out the P4EE for raw grunt.

All previous Extreme Edition CPUs have been based around the same .13-micron process of the Northwood core – this has changed with this version. Downsized to .09-microns, it's built around the same fabrication process as the original Prescott. As an Extreme Edition CPU, it packs 2MB of cache however this has been improved on. The 2MB of L3 cache the P4EE previously enjoyed has now been made into lower latency L2 cache. Aside from that, it also brings to the table a tasty jump in FSB speed to 1066MHz. And an upward surge in price, as has become the legacy of the P4EE.

In a 32-bit environment (to represent current real-world results) we set up the duel between a P4EE 3.73GHz (925XE mobo, 1GB DDR2, 6600GT PCI-E) and an Athlon 64 FX-55 (nForce3, 1GB DDR, 6600GT AGP). Synthetic testing shows the P4EE has the grunt, but even with a bridged PCI-E to AGP card, the FX-55 still managed to slightly overtake the P4EE in FarCry. Retailing at US$999, is Intel's new P4EE worth the dosh?

One major issue that plagues this CPU, as with many of Intel's post-Prescott CPUs, is the thermal power rating. The driving force behind the move to a 90nm fabrication is the resulting lower temperatures and at 115W, it not only draws a lot of power but it still yields this jump in juice via a serious fluctuation in heat. Thankfully Intel's coolers have a reputation for performing surprisingly better than third-party units, but decent ventilation is a necessity. This is where the 600 series come in, with better power management via EIST, thus more appropriate for mini-barebones systems.

Brushing 64-bit to the side, the most significant aspects of this processor are the 1066MHz FSB speed and the 2MB of L2 cache. Intel's move to push 64-bit to the desktop is no doubt a milestone, but the benefits won't be immediately accessible. It just might pay to hold off and see how the dual-cored CPUs perform, due later in the year.

By and large, this is a powerful CPU, but it revels in the reality that its full potential can't yet be exploited. As an Extreme Edition, it won't age quickly, so if you can afford it and you can see yourself making use of the 64-bit ability in the near future, this CPU will certainly keep you going. Equip this with the highly capable 925XE platform and you'll be rocking mates' envy jocks with a good measure of rigourousness.

64-bit for the desktop is here, it's simply waiting for the floodgates to gush open.

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iRobot Roomba Discovery

Sucking, blowing – **Nathan Davis** can't get enough of the sensory action.

specs

Price **$599**
Supplier **Salton**
Website **www.salton.com.au**
Specifications **Low-profile automated robotic vacuum cleaner; two filters; two battery-powered virtual wall units; home base; three-hour recharge; stair, wall and dirt sensing; IR remote.**

hotaward

We all have a secret love of robots. Surreptitiously, we all know they are the future rulers of Earth. They do things without question; performing actions that humans prefer not to do – like cleaning the floor. Shooting any notion that we would never review a vacuum cleaner in the left nut, the iRobot is a realised dream.

For some time, we have longed for the fabrication of the robotic house-cleaner and this is one giant step closer – because let's face it, we're too damn busy performing immensely important tasks. Like keeping the olfactory glands clear.

In and out of *Atomic* HQ, ears twitched when 'robotic vacuum cleaner' was mentioned. Basically, the potential audience for this product is massive – if it works.

Based on technology that iRobot developed for its mine-sweeping robots, no matter how random the fella seems to be moving around, it's following a set algorithm that maps out the size and shape of the room in order to cover the entire region via its tracking method of lightly bumping into things. It's even packed with an IR remote control (hopefully spin-offs will feature RF).

Technologically cool... but how does it perform? Luckily, it never failed to impress us. We tested with a range of surfaces and dirt – there's no doubt this is a thorough vac. Anything up to low-profile carpet it handles like a dream. We even poured a wad of sugar on the floor and it picked up every last crystal. Additionally, with its low profile, it easily scooted under the beds and couches, cleaning areas we otherwise wouldn't dare.

It takes much longer for it to zoom around in comparison to a standard vac, but there's no need for you to be around. Hit the clean button and go out. Well, try and go out. More often than not, we would succumb to the desire to stare at this little marvel of engineering as it went about its business.

In auditory terms, it's much less noisy than a standard vacuum cleaner and it's quiet enough to run at night without driving the neighbours nutty. That said its bumping nature might prove annoying closer to home.

Sensors. It has lots of 'em. If you have stairs, it will move to the edge and stop as if it hit a wall. If it runs into an object, it'll first attempt to go around it, in the case of a chair leg; otherwise it'll follow its wall sensor. It even has dirt sensors so it knows to go back over a certain area. Ingenious.

The model we sourced, the Roomba Discovery, comes with a home base. After about two hours worth of slaving on your floors, thanks to the guidance of IR it searches for the home base, settles down on it and juices up in three hours, ready for more.

The supplied virtual walls come in handy for when you don't want the Roomba to roam in certain areas. They emit a wall of IR signals that tell the vac to stay clear.

Filters need replacing every couple of months, but otherwise maintenance is low. Naturally it needs emptying fairly regularly, dependant on your dirt-to-floor ratio.

Strangely, the spinning corner brush didn't reach smack in the corners. Loosely lying cables are something you'll need to tie down or keep out of reach, as it tends to grab these with its pokey IR transceiver.

It isn't meant to replace your vacuum cleaner, but this depends on your cleanliness requirements, as it will at the very least make cleaning far easier. Unless you live in a house where all the rooms are on varying platforms (greater than ~1cm), there is no reason every geek shouldn't have one of these. This is the microwave of the cleaning world.

Now all we ask for is a robot that can whip up cups of freshly ground coffee and clean, fold and stack dirty clothes on the fly. And perhaps cook meals.

score

9.5 OUT OF 10

Link your home computers, gaming consoles, printer and share your broadband. With all the computers in the house connected together, everyone benefits instantly. Before you know it you can be completing online research for that last minute assignment, while your flatmates battle it out and test their gaming skills against the rest of the world. Wireless enables you to complete your assignments whilst listening to your favourite music without leaving your comfy chair. Whoever wants to use the internet, however they want to use it, you'll all be connecting more because no everything's possible 24*7

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Shuttle SN25P

Ty Pendlebury digs down to the ess-en-tials and pries through Shuttle's nForce4 shoebox.

specs

Price **$680**
Supplier **Altech**
Website **www.altech.com.au**
Specifications **NVIDIA nForce4; one 5.25in and three 3.5in bays; one PCI-Express x16 slot; one PCI-Express x1 slot; SATA RAID; Gigabit Ethernet; eight-channel AC'97 audio; integrated 8-in-1 card reader; 350W PSU; 4.25kg.**

Up until recently, the terms 'gaming enthusiast' and 'small form factor' have rarely gone together. This has a lot to do with the heat issues inherent with a small case and a serious lack of raw performance. Shuttle has been working to dismiss this notion with its new series of gamer barebones, the newest of which is the nForce4-powered SN25P.

Shuttle has opted for stealth drive bays in the SN25P, making your choice of optical drive much less important if you wish to maintain a schmick appearance. Aside from that, this system uses the same P-chassis as Shuttle's other enthusiast barebones system, the SB95P, with the primary difference being an nForce4 backbone rather than an i925.

Internally, there have been some changes to the layout, particularly in the implementation of the ICE cooling system. Gone are the heatpipes and external exhaust in favour of a BTX-styled forward layout and heatsink. Unfortunately installing the cooling unit was significantly more fiddly than the norm. Each retention screw had an overly powerful spring underneath it and a good measure of force was required to fit all four.

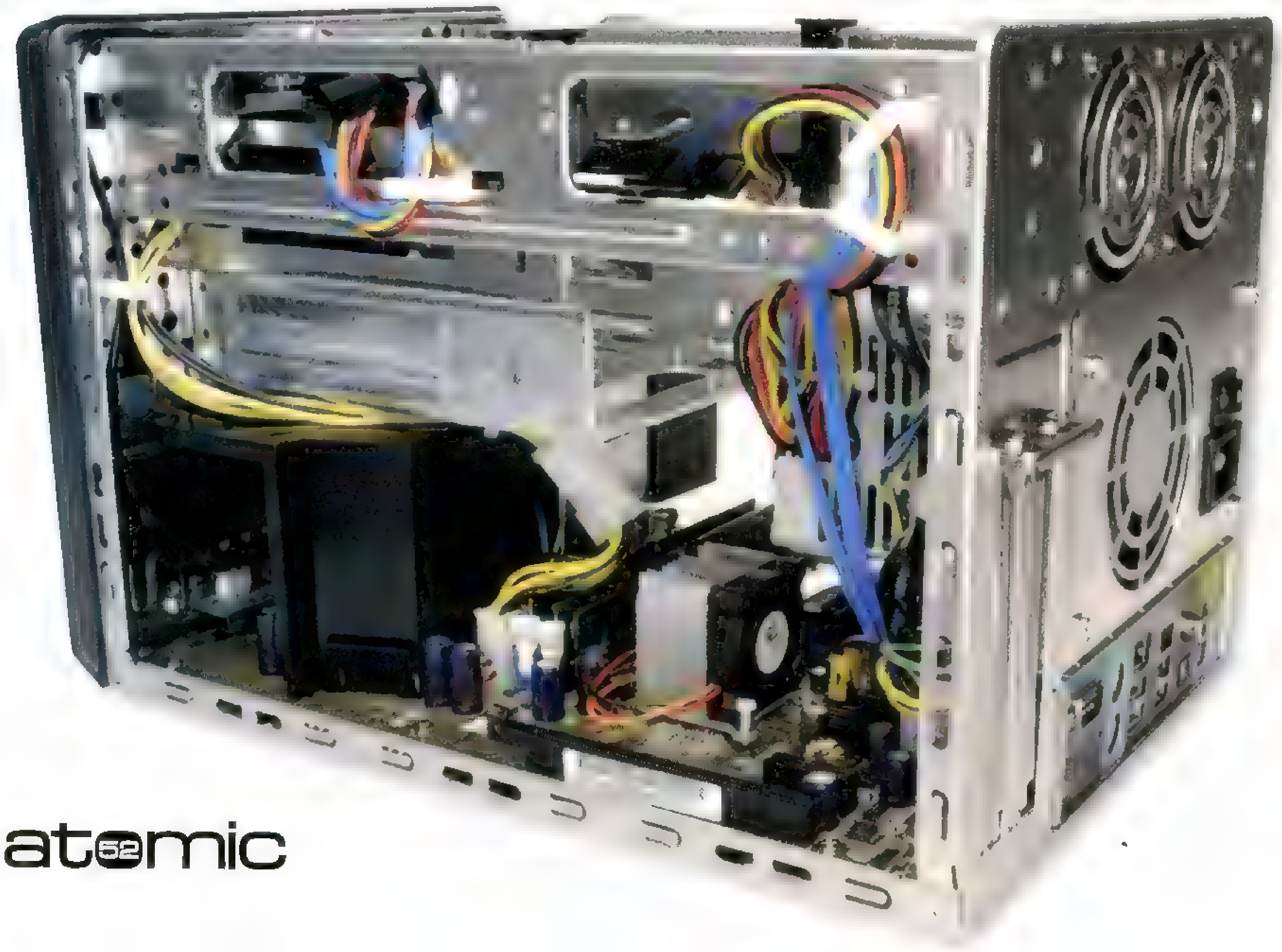
The drive cage remains, however it has been upgraded to take three 3.5in drives, and a tool-less drive mounting system that isn't quite as sturdy as others we've come across, with small metal hooks instead of metal or plastic lugs holding the drives in place. Cable management is another feature, which is really quite nifty – snap-able clips hold the pre-installed SATA and IDE cables in place and they are a breeze to use. Scrawny PSUs are a thing of the past, as the P-chassis features a 350W power supply and it also has SATA power connectors. Unfortunately there was no PCI-E six-pin power connector. If you're using cards requiring extra juice, you will have to make do with the adaptors included.

As with any SFF, the upgrade options are limited by their small size. There are only two RAM slots and these are mounted left to right, not back to front, as is part of the BTX specification – not surprising however, as it's not a BTX board. There is a single PCI-E x16 slot for the necessary video (given there's no onboard video-out) and a PCI-E x1 slot for when such add-on cards become a little more common place.

One of the disappointments of the nForce4 chipset has been NVIDIA's 'back-down' on any form of HD sound, all thanks to the irrational removal of SoundStorm. As a result, the onboard sound is a little lacking in the 'Wow' department. Thankfully, you're free to whack in a better solution.

Considering it is an enthusiast machine, the lack of a VGA-out is not unusual, but with limited slots and substandard audio there are better options. Nonetheless, on the rear of the case there are digital-ins and outs included for those with quality external decoders. Rounding out the I/O section is a 'Clear CMOS', which is recessed to prevent mischievous LANers from frigging with your machine.

Other companies are beginning to catch up on the Shuttle XPC – particularly FIC, which not only offers better accessibility but three expansion slots. The SFF is becoming increasingly crowded by such competitors who, rather than simply aping Shuttle's designs, are striking out on their own and creating some compelling devices. So watch this space to see what Shuttle plans to do about that.

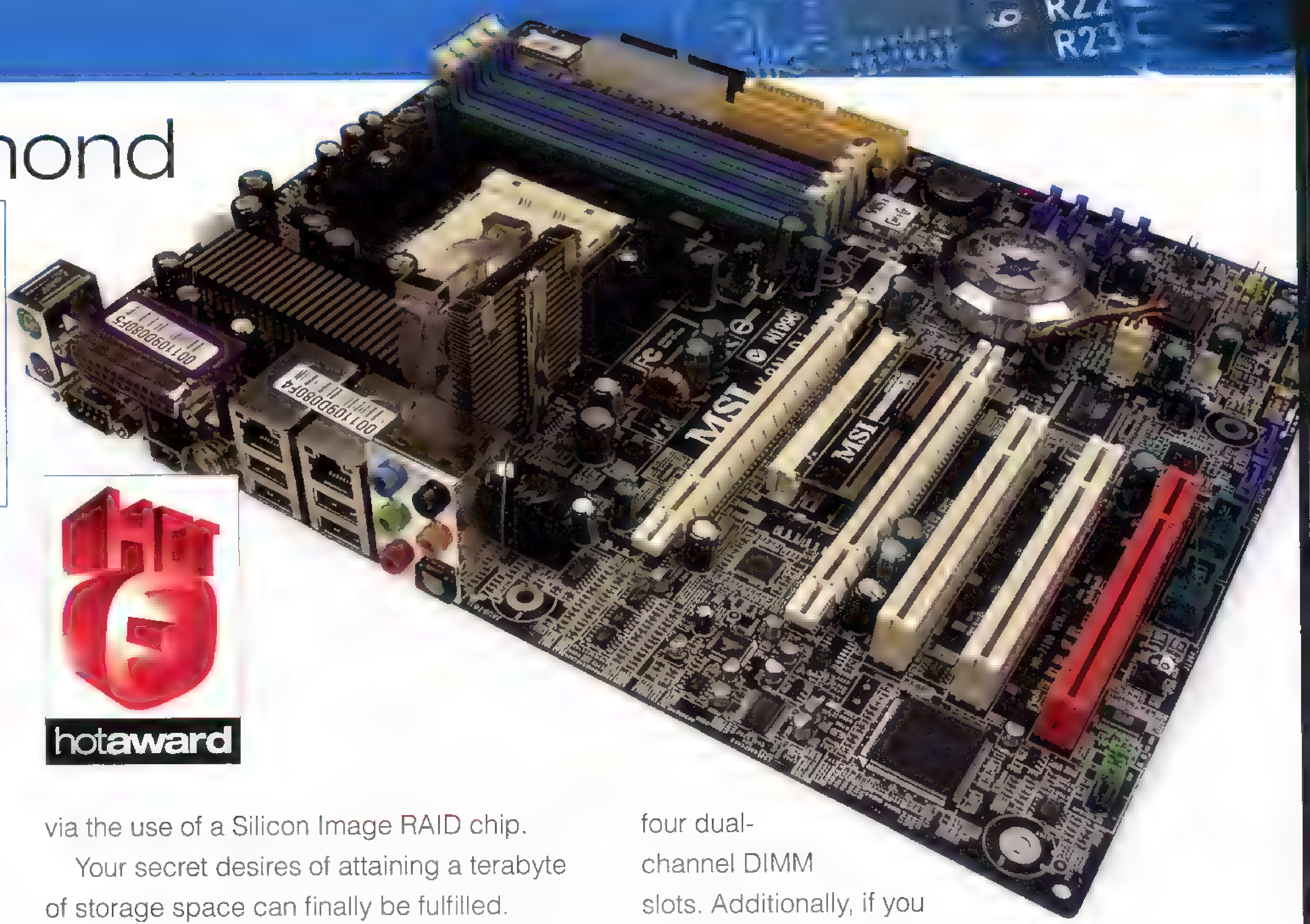


score **7.0** OUT OF 10

MSI K8N Diamond

specs

Price $TBA
Supplier MSI
Website www.msicomputer.com.au
Specifications NVIDIA nForce4 SLI; four dual-channel DIMM slots; six SATA ports; two PATA ports; two x16 PCI-E slots; three 32-bit PCI slots; dual gigabit Ethernet ports; onboard 7.1 Creative SoundBlaster Live! 24-bit sound.



hotaward

If you're after an Athlon 64, PCI-Express based system, the nForce4 is the chipset you're after. If you've been hanging out for SLI, well, it does that too. The difference of course being two x16 PCI-Express slots. But MSI went further than that on this black beauty.

With the cry of disappointment from the industry regarding the severe lack of a SoundStorm presence on the nForce4 chipset, MSI ingeniously integrated a Creative solution – yes, yes, pun intended. This is a damn nice find for any board. It's not exactly an alternative to Creative's current range, but at 24-bit, 96kHz chip supporting up to 7.1 surround, it shatters any form of AC'97 like a baseball bat to the kneecap.

This board makes full use of nForce4's quad SATA port offering with the addition of two more via the use of a Silicon Image RAID chip.

Your secret desires of attaining a terabyte of storage space can finally be fulfilled.

You'll want to make sure you have the right size power supply, the new ATX 24-pin type to be exact. Both sides of the rail use this standard now, so jumping ship is easier down the track.

Overall, it's a well packed-out, future-proofed nForce4 mobo with great onboard sound, dual Gigabit Ethernet, six SATA ports and four dual-channel DIMM slots. Additionally, if you have SLI in your sights, this gem would be a powerful home for your soon-to-be beast. **ND**

score 9.0 OUT OF 10

Western Digital 320GB Caviar

specs

Price $325
Supplier Western Digital
Website www.westerndigital.com.au
Specifications 320GB PATA HDD; 8MB cache; 7200rpm; three platters; six heads.

Caviar is the collective spawn of certain large fish and, reportedly, a delicacy. Which probably isn't too dissimilar to this drive, metaphorically speaking. New HDDs continue to grow in size and they're not about to stop. Only there is a SATA bandwagon, but not everyone is willing to jump on-board just yet. So, to give everyone a darned good reason to stay back a little longer, Western Digital has whipped out a behemoth 320GB 7200rpm PATA drive.

As you may know however, the 320GB tag is not exactly what one might think – before formatting, this really amounts to 298GB of free space. It's something we've come to expect from hard drives for awhile now, and the problem will only get bigger – or is that smaller – as time goes on.

In our standard AMD test bench, we clipped on the new Caviar and let it strut its stuff. Testing with SiSoft Sandra 2005, it managed a sweet 55MB/s drive index. For comparison, the Western Digital 36GB SATA 10,000rpm Raptor we looked at some time ago spat out a drive index of 43MB/s. Per se, it's evident this new drive is no lamer and PATA can still whoop some SATA arse. It also runs significantly cooler and quieter than the Raptor.

Nothing spectacularly different from the norm, aside from the mighty boost in storage retainage and the use of PATA. Grab a few of these and you'll laugh insanely, bringing you slightly closer to the holy *one quadrillion bytes*. Recommended for the storage buff. **ND**

score 8.5 OUT OF 10

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asus wl-500g deluxe

ASUS WL-500G Deluxe

specs

Price $179
Supplier ASUS
Website www.asus.com.au
Specifications Fully configurable 802.11g/b 54Mb/s router; four 10/100Mb/s Ethernet ports; one WAN port; web cam with security functions; two USB ports; reads and shares USB drives; printer server; port forwarding.

hotaward

This Ethernet and wireless 802.11g/b router, although it has no modem – which would be the marriage of hardware to the max – is superbly fitted out for the home. It even comes with a damn web cam.

Although not as configurable as a custom Linux gateway box, it does come close while retaining the ease-of-use element. It has a four-port switch and two USB ports. These USB ports can be used to host a printer and even the aforementioned web cam. Sporting the ability to take a snap shot and email you the image whenever movement is detected, this is an easy way to fill the inbox if you have pets.

Inside there's a bunch of features including a configurable firewall with DoS protection, DHCP, NAT and port forwarding, among others. Aside from the networking goodies, something usefully different is the ability to plug in an external USB storage medium and have the router share it as a resource via FTP.

As expected, in order to write to the drive, the file system must be in FAT32 form – or NTFS if you just want it to be read-only. This makes it great for use as a quick central data deposit.

Where there's data movement, there's no true security – one of the first rules of networking. But just to blow any such form of ideological thinking out of the water, there's a reset button on the back with the default username, password and local IP address written on the base. Definitely one for the home.

Its plastic build gives it a cheap feel, but nonetheless, whether used as wired or wireless, this is a solid, feature-packed, yet easy to use gateway for the cable-free home environment.

ND

score **9.0** OUT OF 10

corsair water cooling kit

Corsair Water Cooling Kit

specs

Price $349
Supplier Altech
Website www.altech.com.au
Specifications Water cooling for Socket A/T (or Socket 939/478 for $339); copper CPU block; 120mm fan; all tubing 95mm inner diameter 'food grade'.

Corsair, made famous by its sticks of memory, has gone for a skinny dip. First with the external 'big black box' HydroCool we looked at many moons ago and now with this baby.

Simple in design, we easily put it together with no leakage in the recommended cycle of CPU block, reservoir, pump and radiator.

Pipes are already connected to the CPU cooling block, otherwise the rest of the piping is up to you, a pair of a scissors and the supplied metre-long tubing.

Fastening the cooling block onto Chernobyl, we fired her up to the usual 80W. Smashing any preconceptions that memory manufacturers should stick to making RAM sticks, it peaked at an incredibly low 38°C – this, in an ambient room temperature of 26.5°C. Gob-slamming to say the least.

Keep in mind that the radiator is designed to use the exhaust, not fresh air like in our testing environment. The majority of the heat in the case, however, will now be gone – albeit, not from the GPU as there is not yet an available cooling block.

The only issue we had with this kit was the main manual. It's on CD – and it's a damn good manual – however it would've been even better in print. This of course isn't a problem for people with access to multiple machines.

In closing, it's about bloody time. Finally here's a cooling kit that's easy to install, quieter than comparable HSFs and actually manages to demonstrate the awesome advantages that water cooling brings to the table. And this really *brings* it. Kudos to Corsair.

ND

hotaward

score **9.5** OUT OF 10

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YOUR NEXT

The power and speed of today's components are just stepping stones to tomorrow's tech. What will your next PC look like in the years to come? **James Wang**, **Bennett Ring** and **Leigh Dyer** reveal where your next upgrades will take you.

Countless processing units

The central processing unit of tomorrow will be a totally different beast than that of today. It will no longer be a processing 'unit', but rather multiple units. Nor will it be 'central', but rather spread over multiple cores. It will, however, still do processing, but many truck loads at once.

CPU performance increases in the last few decades have come from two sources: higher frequency and improved architecture. Future CPUs will still use these two techniques but will no longer rely on them solely. Future CPUs will have multiple cores on the same silicon chip; each CPU (as we'll continue to call them) will in fact be multiple CPUs.

Having multiple CPUs work as a computer system is not new. Symmetrical Multi-Processing has been around for many years and allows two or more CPUs to be installed in the same box. Clusters allow even more CPUs to work together by linking up multiple computers on a network. What is new with multi-core CPUs is that for the first time, mainstream CPUs are integrated on the same silicon chip.

How is this significant and what does it tell us about the future of the CPU? The most significant aspect of having on-die integration is that thanks to Moore's Law, the number of cores on a CPU will increase dramatically.

When we had multiple CPUs on the motherboard level, it never grew beyond four CPUs per motherboard. After all, there's only so much space on the motherboard and only so many hardware slots can be provided. When the CPUs are integrated on the same chip, this problem disappears.

Moore's (revised) Law predicts that the number of transistors on a chip will double every two years. This means that if we see dual core CPUs in 2005, we can expect to see quad-core CPUs of the same type arrive in 2007. Following on this pattern, by 2017, 128 cores of the original chip can be fitted on the same area of silicon. Inevitably there will be the overhead of communication logic, but they won't be so complex as to halt the growth.

The number of cores on future CPUs depends mainly on the complexity of each core. If they remain identical from one generation to the next (unlikely), the doubling will occur roughly every two years. If each core becomes more complex, progress will be slower. On the other hand if they are simplified, we can more than double the number of cores every two years.

In the coming years, you will observe two kinds of multi-core chips. The first type will feature two or more cores of fairly complex nature. They will most likely be two regular CPUs crammed on the same die. Intel and AMD will be in this category. It makes sense for them to do this as single threaded applications will run just as fast if not faster while allowing for future programs to exploit multi-threading.

The second group will have many cores but each one will be far simpler and a lot more specialised. These CPUs will serve a market where the applications are already heavily

PC

threaded (servers) or where applications are yet to be written (consoles). Sun's Niagara chip and the Cell processor fall into this category.

Will Moore's Law continue? Without a doubt, for at least another 15 years. At this year's Intel Developer Forums, Intel reaffirmed that Moore's Law is not slowing down and expects to move to new process nodes every two years; 45nm in 2007, 32nm is 2009 and 22nm in 2011.

For future CPUs, this means slower increases in clock speed but leaps and bounds in integrating multi-cores. Next year, Intel is expecting 85 percent of their shipping CPUs to be dual-core.

Beyond silicon

What is it: **Molecular computing**

When is it coming: **2025 and beyond**

In his celebrated book *The Age of Spiritual Machines*, Ray Kurzweil showed that the exponential growth of computing didn't start with silicon chips but rather much earlier. Computers evolved through five stages: electromagnetic, relay, vacuum tubes, discrete transistor and integrated circuits. When he plotted the computing power available for each era, they roughly joined up to form an exponential curve. From this he argued that computing power in general has been increasing exponentially. He also made the intriguing observation that just as one technology reached its limit, another totally different computing technology would come in and carry on the growth. He therefore postulated that when silicon reaches its limit, a new technology will pick up where it left off. That technology could be biological, nanotech, quantum or something else. Kurzweil however argues that DNA and quantum computers would make poor general purpose computers. Instead, he believes 3D molecular computing will be the next big thing.

What is it: **Quad-core Pentium processor**

When is it coming: **2008**

With four Pentium processors (either Pentium 4 or Centrino based) on a single chip, there's little you can't do. Thanks to Intel's Vanderpool technology, you can run multiple operating systems at once; Windows and Linux can finally live together without compromise. Assuming Hyper-Threading is enabled on these cores, this mega CPU will be able to run eight threads. Multi-threaded applications will simply fly.

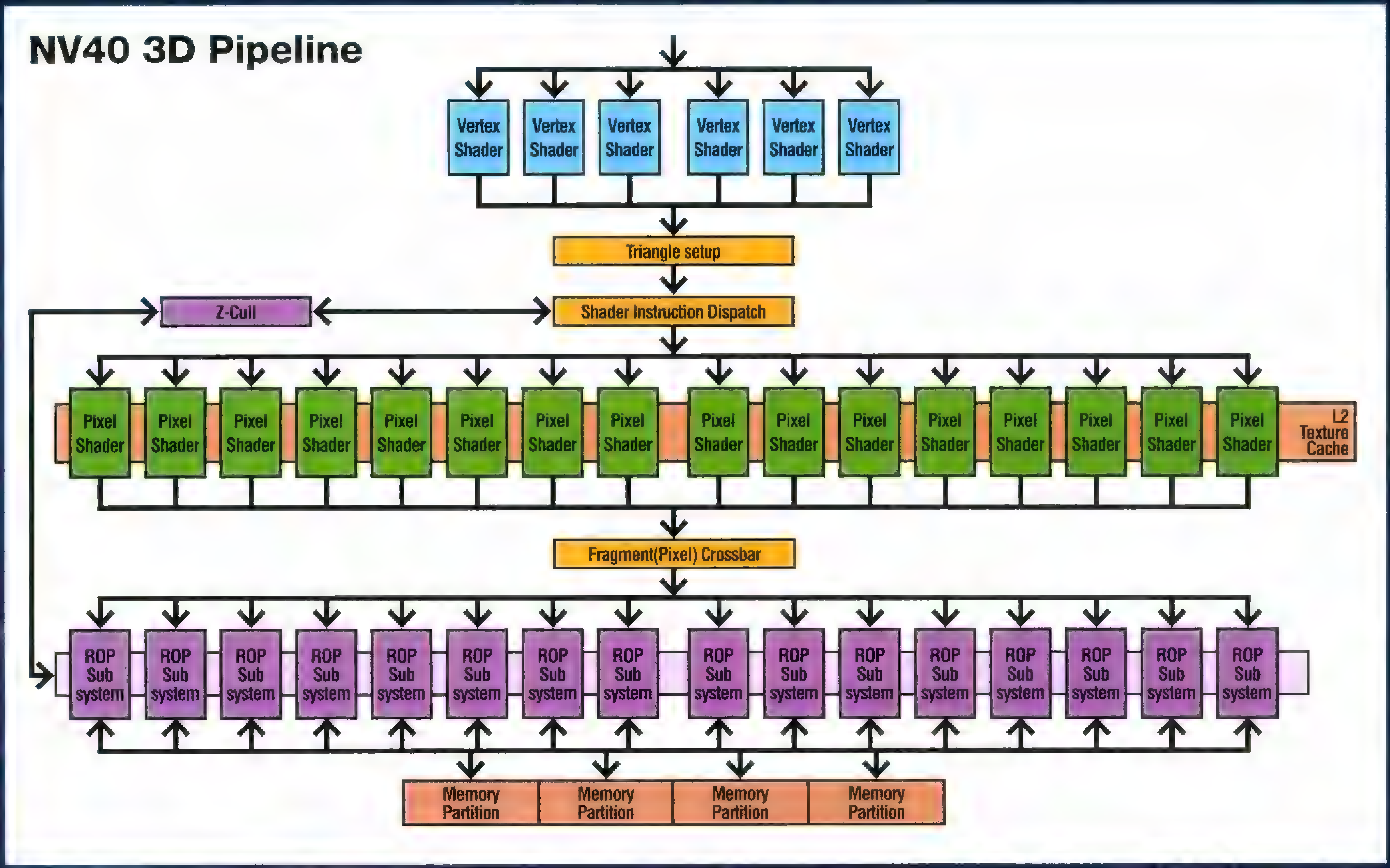
What is it: **Dual-core Athlon 64 processor**

When is it coming: **2005**

The dual core Opteron server chip will come in the first half of the year followed in the later half by the desktop Athlon 64. With an on-die memory controller to feed the CPUs, AMD's dual-core solution is much more mature and well thought out than Intel's.

In true AMD fashion, the chip will be compatible with most currently available motherboards too.

→



To nFINITY and beyond: the future of Graphics

If we had told you in 1995 that graphics accelerators in ten years time would be running at 500MHz with 16 programmable pixel pipelines, six vertex engines and the ability to effortlessly render real time shadows as well as doing massive scientific computing, you would have smacked us silly with a trout heavier than an SGI workstation.

Well, it's 2005 and that's exactly what GPUs can do. These breed of processors grow so fast that they're said to defy Moore's Law. Of course, if a chip is made from silicon, it can't beat Moore's Law. GPU performance has grown faster than CPU's but their transistor count at the same price point remains the same, in line with Moore's prediction.

GPU performance increases have come mainly from higher clock speeds and additional pipelines. Unlike the CPU which has exhausted its tricks, future GPUs will continue to use these two techniques to drive performance.

Today's top of the line GPUs contain six vertex processors to manipulate geometry and 16 pixel processors to work on pixels. Both types of processors can do similar work and indeed have very similar instruction sets. With the next generation of Windows, Longhorn and the introduction of Windows Foundation Graphics 2.0, pixel and vertex shaders may very well be unified.

While a common piece of hardware with the same instruction set is nice and elegant, it's not clear that it's the best solution. NVIDIA is not convinced. Their chief scientist David Kirk called such shader hardware 'Jack of all trades, master of none.' When we spoke to John Montrym, NVIDIA's chief architect, he also gave a lukewarm assessment of unified shader hardware. ATI on the other hand has made it clear that its future GPUs will employ unified shader architecture.

So who's right? It's a delicate balancing of issues. A specialised vertex or pixel shader will always be faster than a 'generalised' one. So individually, unified architecture will be at a disadvantage. On the whole, however, a GPU using generalised shaders may prove to be more efficient than one without.

Because pixel processing can only occur after geometry processing, if one of the two stages takes too long, the other sits idle. For example, a vertex shader intensive game with simple pixels operations will overload the six vertex engines while leaving much of the 16 pixel pipelines sitting still. Conversely, a game that's low in geometry but applies a dozen effects to everything will choke the pixel pipelines while leaving the vertex hardware unused.

Unified shader hardware won't have such a problem. If a game is very well balanced between vertex and pixel shading, a unified shader GPU with 32 general shader units will split them evenly for vertex and pixel shading. If a game is geometry dominant, more units will be allocated to do just that while the remaining will work on pixels. As a game's content changes from frame to frame, such a GPU

Pat Gelsinger, Intel's senior vice president. He likes CPUs.

Once upon a time, hardware set the technology benchmark, and developers were left to catch up. Now, with programmable shaders and other advanced effects, it's up to companies like NVIDIA and ATI to feed gamers with more powerful chips.

will be able to intelligently allocate its shader resources to best draw the picture.

While such a scheme sounds almost too good to be true, the alternative is by no means doomed. NVIDIA has a track record of making very efficient hardware. Current architectures have fragment buffers between the vertex and pixel pipelines. This alleviates much of the work balancing problem by providing a constant pool of pixels for the pixel shaders to work on. NVIDIA will most likely provide the same instruction set for both vertex and pixel shaders in future GPUs but still use different hardware. That being said, in the very long run, NVIDIA may eventually move to a unified architecture.

Differing implementations aside, both NVIDIA and ATI's GPUs released alongside Longhorn will have to support Shader Model 4.0, requiring a unified instruction set across the shaders. That means the type of operations and the limits on what can be done with shaders will be the same for pixel and vertex shaders. From then on, the programmer won't have to think about pixel or vertex instructions, just shader instructions.

Shader Model 4.0 brings in more programmability for the GPU as well as other benefits. It's expected that the GPUs will move to support virtual memory which will give the programmer an almost unlimited space to work with, for both textures and geometry. Better higher ordered surface support and tessellation is also a big part of the next DirectX. Together with the new shader model, this will finally give programmers what they've been craving for, from dynamic geometry generation to curved surfaces.

In the coming years, PCs with multiple graphics boards will become even more prevalent. NVIDIA has a very clear vision on these types of systems. Their CEO dubbed upcoming PCs armed with multi-core CPU and multiple graphics cards 'gaming supercomputers'.

For them it's the creation of an entire new market through nForce chipsets and SLI. For us it's the opportunity to build machines twice as powerful – or more – than ever before. And seeing now that vendors like ASUS and Gigabyte are making dual-chip boards, don't be surprised if two dual-chip boards sit next to each other to allow quad-GPU gaming goodness.

What is it: **ATI R5xx series**
When is it coming: **2005-2006**
With unified pixel and vertex shader hardware, it's a major milestone for GPU architecture. The number of shader units is anyone's guess. Expect massive shader throughput and the bandwidth to match. A specialised version, possibly with on-die memory will power the Xbox Next.

What is it: **NV5x series**
When is it coming: **2005-2006**
NVIDIA's Michael Hara said that NVIDIA's next generation GPU won't be architecturally that different from their current GeForce 6 architecture which was designed to last two to three years. But we do know that a variation of its next generation GPU will power Sony's next Playstation, and Sony is known for demanding insanely powerful processors.

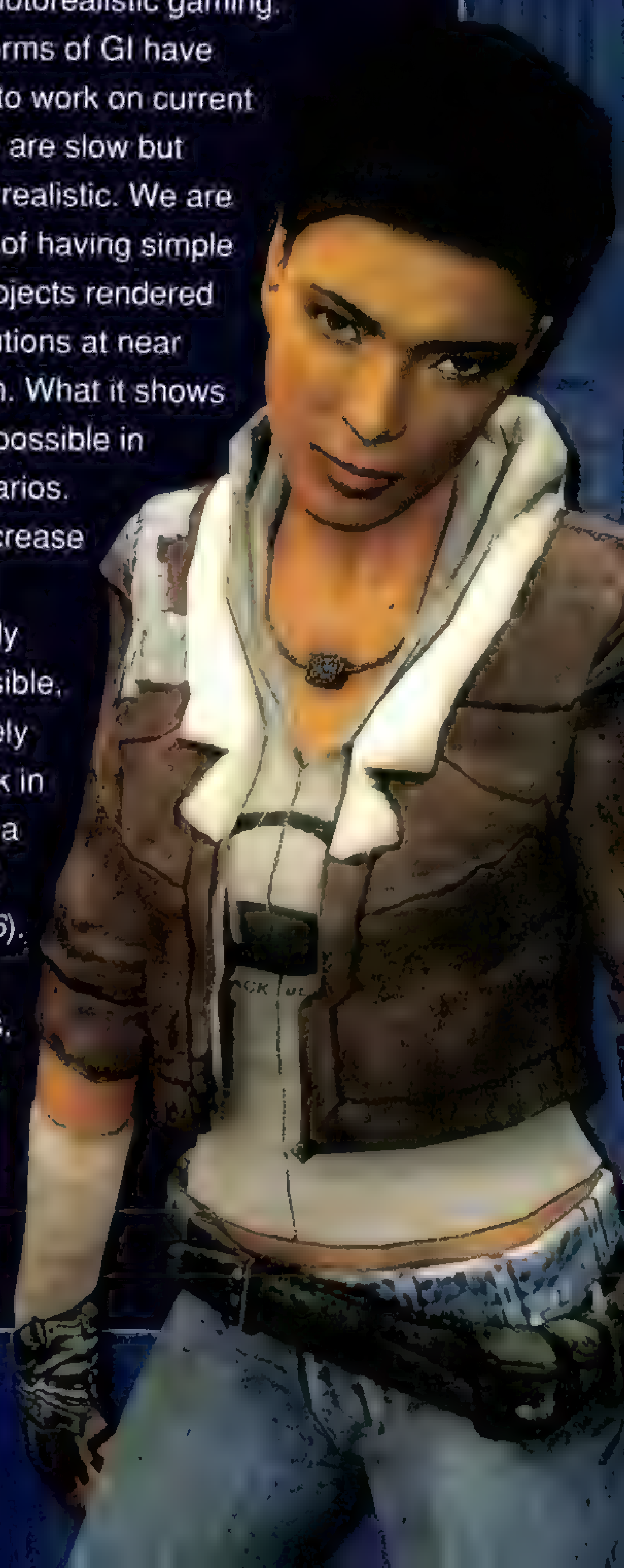
→

Photorealism

What is it: **Photorealistic graphics**
When is it coming: **2012-2020**
How much power is required to simulate the world perfectly? All the energy in the universe. That's how the universe does it, naturally. But thanks to the mad scientists at NVIDIA and ATI, we won't need that much. To reach photorealism, progress needs to be made on two fronts. Firstly we need to find out why the real world looks the way it does (research in light-surface interaction). Secondly, we need to find a cheaper way (approximate algorithm) to fake it on the GPU.

Raytracing is much closer to how the world works than rasterisation (all current games). With raytracing, reflections, refractions and accurate shadows are automatic. The most realistic CG effects use raytracing of some sort. Photon mapping and radiosity lighting also use similar principles and can produce very accurate effects like caustic reflections and colour bleeding. These algorithms are known as global illumination or GI. We'll need them in some sort as we approach photorealistic gaming.

Limited forms of GI have been made to work on current GPUs. They are slow but tantalisingly realistic. We are at the stage of having simple geometric objects rendered at low resolutions at near photorealism. What it shows is that GI is possible in limited scenarios. As GPUs increase in power, it will eventually become feasible, or alternatively they will work in tandem with a physics card (see *page 16*). And when that happens, games quite literally will never have looked so good!



Half-Life 2 took us a few steps closer to photorealism.

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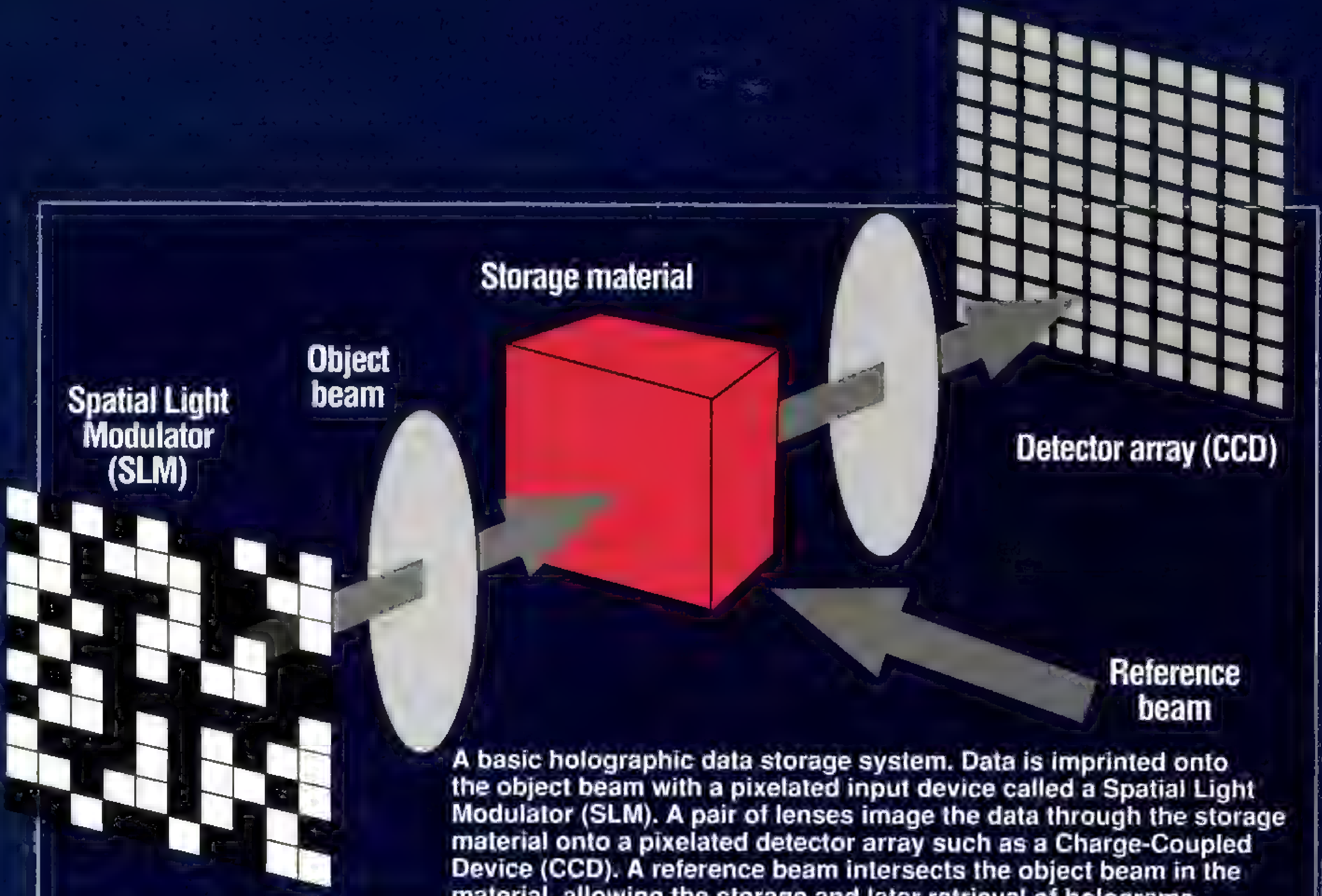


A basic holographic data storage system. Data is imprinted onto the object beam with a pixelated input device called a Spatial Light Modulator (SLM). A pair of lenses image the data through the storage material onto a pixelated detector array such as a Charge-Coupled Device (CCD). A reference beam intersects the object beam in the material, allowing the storage and later retrieval of holograms.

Stacking up storage

The world of storage has been relatively static for many years now – hard drives are really only old technology that has evolved many times over the years, but never revolutionised. New RPMs and more advanced interfaces have led to speed improvements and dramatic volume increases, but the pace of change has been no where near as rapid as that of CPU and GPU development. Rather than look at short term SATA II drives which will differ little from that we have today, we'll take a look a little further down the track and see what's around the corner. So, when the time comes for hard drives to bow out, what type of storage will your future PC be using?

What is it: **Flash memory drives**
When is it coming: **2007-2008**
Samsung demonstrated an 8-gigabit flash memory chip at the end of 2004, based on a 60-nanometre process.

Using this same design, it will be possible to store a whopping 16GB of data on a single PCB. This design is based around a 3D cell transistor structure, as well as high-dielectric gate insulating technology, and is known as NAND flash memory. Not only has this boosted the size of the storage medium, it has also dropped production costs by a massive 50 percent. By 2007 this capacity should have doubled to 32GB, if developments at SanDisk are anything to go by.

While these flash based drives, if they become econimoically feasible, will pale in size compared to hard drives they could still allow for flash based boot drives of incredible speed providing not only fast boot up and program loading times, but also the ability for proper suspend/resume systems that blink on at the touch of a button.

It's very likely hybrid devices which combine both solid state memory for fast access as well as magnetic storage to satisfy the need for a large capacity, will be due in the very near future.

What is it: **Holographic storage**
When is it coming: **2010-2015**
Today's magnetic storage has a major limitation: it only records information on the surface of the medium in a two dimensional manner. This means there's a whole lot of unused space. One of the major benefits of holographic storage, also known as holography, is that it's a volumetric approach to storage. Every cubic millimetre of the storage device is used to store information. This means that it's possible to cram much more information into even smaller devices.

The theoretical limits of this technology, according to IBM at least, are several tens of terabits *per cubic centimetre*, compared to the mere gigabytes of modern magnetic storage.

As well as offering enough storage to take care of even the most demanding leecher, holography should also boost the speed of retrieving information from our ever growing data libraries.

Today's storage devices rely upon mechanical systems to access data, but a holographic device is limited only by the speed of the lasers that are used to fetch information from the optical imprint within the device.

Holographic storage isn't a new concept – it's been kicked around by various white coated boffins for several decades.

However, it's only thanks to the maturation of enabling technology, such as liquid crystal displays and solid state camera chips, that it's now becoming an affordable approach to storage.

What is it: **RAM developments**
When is it coming: **2007-2010**
With the border between system memory and solid state storage crossing ever closer the evolution of RAM ultimately comes under our main storage heading. Today our system DRAM faces the same problems as our CPUs. It's hitting a wall of technical complexity, fabrication costs and the limits of the physical manufacturing process – it's only possible to shrink existing technology so far. A range of replacements are being researched, including ferroelectric RAM (FRAM), magnetoresistive RAM (MRAM) and phase change RAM.

MRAM is one of the most popular of these new techniques, and is under development by every major memory manufacturer. Magnetic fields are used for memory storage as opposed to the purely electronic method used by today's DRAM, with the most common form of MRAM using memory cells based around magnetic tunnel technology. This uses minute magnets to store data, which results in a dramatic lowering of power consumption. Motorola appear to be one of the first companies to aim to use this technology in the real world, already using it as storage on some of its mobile phones.

What is it: **Distributed storage**
When is it coming: **2015+**
Perhaps the most surprising method of future storage isn't actually a storage medium at all. Thanks to the rapid evolution of the internet and wireless networking, it makes sense that the devices of the future won't need to have massive storage areas. Instead they'll fetch just enough data as necessary from larger centralised storage areas which are located off-site, much like the data warehouses in use by the corporate world today.

So instead of your PC having its own large hard drive, all of your data will be hosted by a centralised data server, from which you'll be able to retrieve it almost instantaneously thanks to the super speedy wireless network connection that will exist at the time.

Obviously for high performance tasks such as gaming, a large amount of that data will still need to be stored on your device during run time, so the need for local storage devices won't evaporate.

However, the development of streaming technologies means that it won't be necessary to download the entire game before being able to play.

Instead it will only be necessary to download just enough to get the game started while the rest is streamed seamlessly.

→

Eye of the beholder

Displays, like every other component, are constantly evolving as faster, sharper, and more brilliant display techniques are researched and manufactured. Today LCD is the norm and is steadily approaching its limits. So when you retire your LCD monitor in years to come, what sort of display device will occupy that prime real estate between the wall and your eyes?

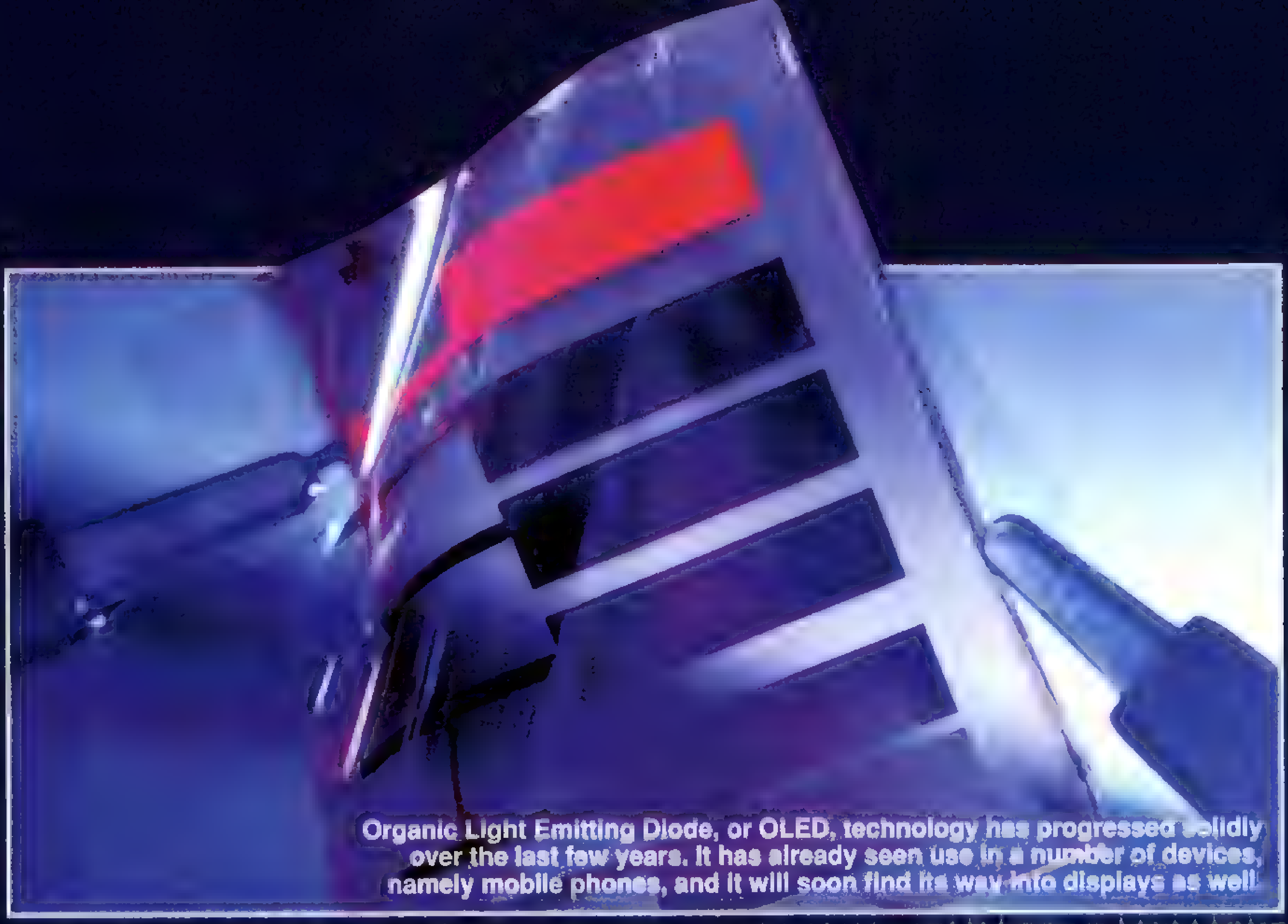
What is it: **Autostereoscopic displays**
When is it coming: **Now**
Autostereoscopic screens aren't anything new – we've even reviewed a few in *Atomic* over the years. They look just like a standard flat screen display, but project a 3D image without the need for LCD shutter glasses or any other external viewing devices. Unfortunately they've suffered from two major obstacles. For starters, they're bloody expensive. Secondly, the picture quality is less than stellar when compared to the ridiculously high resolutions offered by today's traditional display devices. They've also required the user to keep their head in a 'sweet spot' for them to see the 3D effect.

However, recent developments have seen prices drop, resolutions increase, and the ability for users to see the screen from a wide range of angles. The bottom line is that a stereoscopic display is a must have from an entertainment perspective, and this will drive development until such displays are afforable, flexible, and easy to enjoy.

What is it: **Advanced LCD technology**
When is it coming: **Now**
Surprise, surprise, IBM also has its fingers in the LCD technology pie. Its major recent development is known as Roentgen, and according to IBM it's so precise that it's as clear as a paper document. Roentgen uses a new Active Matrix Liquid Crystal Display (AMLCD). It's not the only company to be developing displays based around AMLCD – Xerox is another big player investigating this technique.

AMLCD replaces the usual metals used in LCDs, molybdenum and tungsten, with aluminium and copper. Not only do these allow higher resolutions, they're also much more wallet friendly to manufacturers.

Considering the average CRT monitor has between 80 and 100 pixels per inch, it's hard not to be impressed with this technology's claim of 200 ppi. The prototype Roentgen display has a native resolution of 2560 x 2048 pixels, and uses the same amount of power as an 18" CRT.



Organic Light Emitting Diode, or OLED, technology has progressed solidly over the last few years. It has already seen use in a number of devices, namely mobile phones, and it will soon find its way into displays as well.

While it's initially being targeted at professions which rely heavily on paper or film based presentations, such as photography, radiology and publishing, it's inevitable that we'll see these ultra high resolution displays trickle down to our desktops.

As for standard LCDs, BenQ has just announced the introduction of a 6ms pixel response time LCD. Unfortunately it only has a contrast ratio of 450:1, so there has obviously been a price to pay for this speedy response, something of course which will mature quite rapidly as the market drives demand.

What is it: **Organic Light Emitting Diode (OLED)**
When is it coming: **2006-2007**
Unlike LCD, OLED displays aren't based around semiconductor technology. Instead they're made from carbon-based molecules, which are both brighter and more efficient than LCDs, thanks to the lack of a backlight.

Other benefits include a wider viewing angle, faster response times and smaller, lighter packaging. Eventually OLED displays should also be much cheaper to produce than today's screens, but it's still being held back by one problem – blue OLED elements currently only have a life span of approximately 1000 hours. Red and Green OLED elements don't suffer from this problem, with life spans of over 10,000 hours.

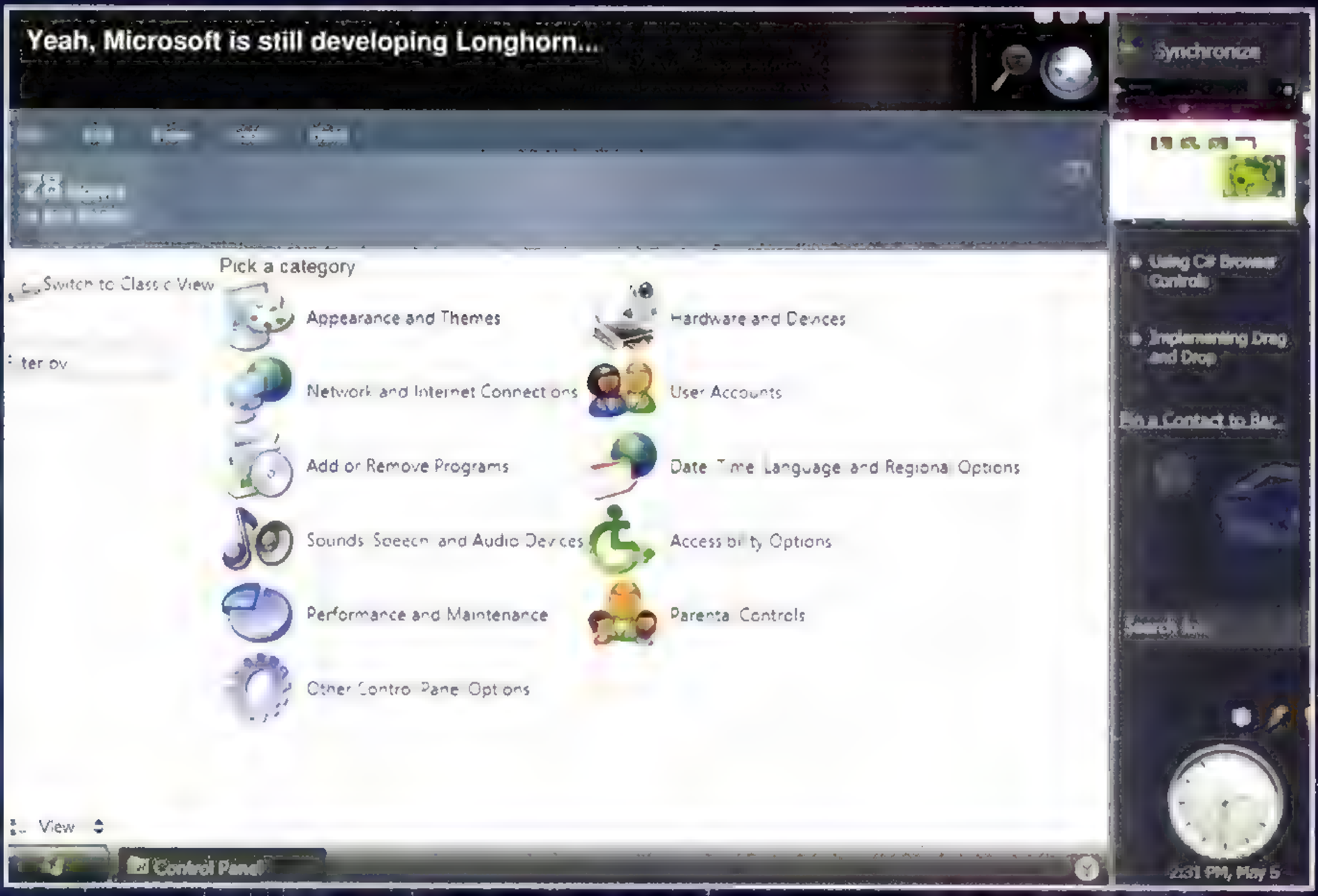
However, Cambridge Display Technology recently announced the creation of a blue OLED component with a lifespan of 30,000 hours, so it appears that this problem will soon be solved. Samsung currently holds the record for the largest OLED TV, releasing a 21" model at the beginning of this year. While its resolution of 1920 x 1200 is impressive, the major noteworthy feature is the 5000:1 contrast ratio, demonstrating one of the major strengths of OLED over LCD. For a breakdown of how OLED works see X-Ray (*page 29*) in *Atomic* Issue 50.

What is it: **Flexible displays**
When is it coming: **2008**
The name pretty much says it all – it'll soon be possible to roll up your monitor like a newspaper. Such displays will be based on flexible, thin substrates that are quite happy to be bent and creased without damaging the device. Though we're sure here at Atomic we'll find the flexible limits one way or another.

The actual display technology can use a variety of techniques, including LCD, OLED and electrophoretic technology. Current flexible displays are still very primitive, limited to very small sizes and only using grey scale pixels. The one second refresh time probably won't turn gamers on either. At least initially.

What is it: **Virtual Retinal Display**
When is it coming: **2015+**
Why use a monitor when you can have images beamed directly on to your eyeball? That's the theory behind VRDs. The image is literally painted directly on to the lucky user's retina courtesy of a laser, and according to users of prototypes it creates an image that is better than competing head mounted displays.

All we're waiting for now are our Ono-Sendais.



Yeah, Microsoft is still developing Longhorn...

Operating systems

It's not as simple a playing field as it might first appear when it comes to predicting the operating system the PC of tomorrow will run. While Windows dominates and looks to further imoprove its foothold with Longhorn, Linux has undoubtedly shaken up Redmond and it looks to continue its steady maturation into becoming not only a solid server platform, but also an eminently viable desktop one as well.

What is it: **Windows Longhorn**
When is it coming: **2006**
The biggest news in the OS world is the ever-impending release of the next version of Windows. Codenamed Longhorn, it may well be the most significant release of Windows since 95.

The big news in Longhorn is Avalon, a new and powerful GUI system overflowing with neat eye-candy, including transparency and 3D effects. Beneath the skin, Avalon is driven by the next version of DirectX, making full use of 3D hardware features such as pixel shaders to keep everything running smoothly. A completely redesigned Windows GUI, codenamed Aero, is built upon the Avalon framework, and aims to make the Windows desktop more simple and elegant.

The second big new feature is Indigo, a communication layer that leverages technologies such as SOAP web services. By seperating data from specific applications, Indigo hopes to make information more widely available to all applications.

Avalon and Indigo are both based on the .NET framework, and form the basis for WinFX, the .NET-driven replacement for the age-old Win32 developer APIs. This framework will be available for Windows XP as well, so developers using WinFX don't need to worry about being limited to Longhorn.

Other Longhorn features include new application deployment and instaler technologies, security improvements, and the integration of DRM technology. Sadly missing for the time being is WinFS, a powerful new data storage layer, which is currently slated for a seperate 2007 release.

→

> **Linux has undoubtedly shaken up Redmond and it looks to continue its steady maturation...**

Sony's wireless speaker system.

Sweet sweet sound

Sound is one area of component development that has, in many ways, reached the limits of its potential. Creative dominates the sound card market with quality good enough for everyone from gamers to music professionals. Increasing number of voices or further enhancing 3D effects will have little impact on the already wide feature set sound cards currently offer. Even onboard sound now matches anything but the most expensive of sound cards, and the limits of human hearing means any further developments in fiedelity will probably be noticed only by dogs. So what else is coming in the sonic field?

What is it: **Wireless speakers**
When is it coming: **2006**
One interesting development, if the scene in Hong Kong is anything to go by, is the advent of wireless speakers, as around 10 percent of the speakers now produced in Hong Kong are wireless. But there's one major problem with this technology. It's not bandwidth, although this is definitely a hurdle to achieving crystal clear sound reproduction; thankfully it's not an insurmountable one. The real issue is power – will it be that we're simply swapping one set of cables for another? However, for most users it's still easier to find a nearby power outlet rather than drag your speaker cables from one side of the room to the other.

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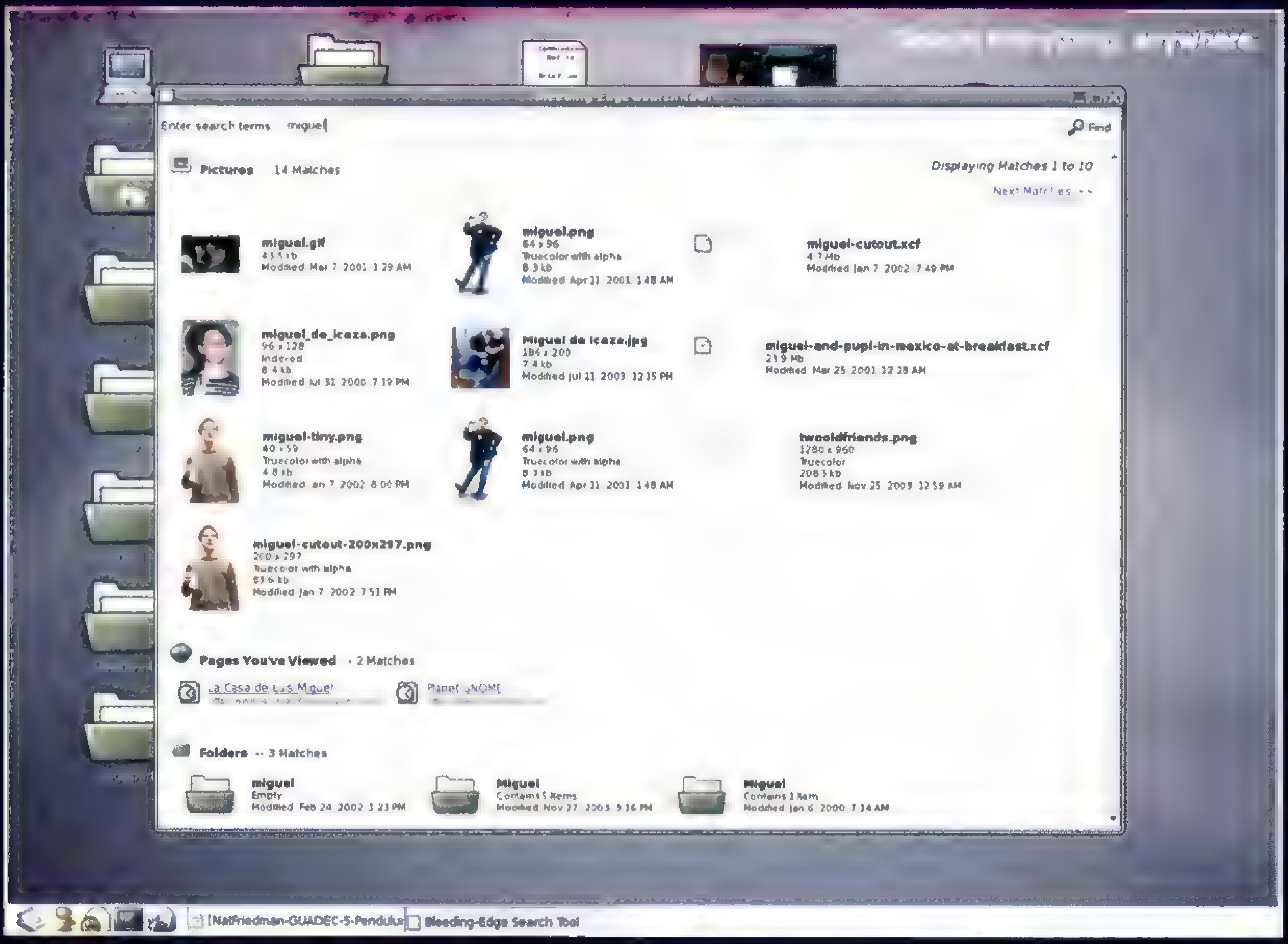
What is it: **Ubiquitous searching**
When is it coming: **Soon**

Web searching has changed the way we find and store information, bringing a sense of order and manageability to the huge steaming mess that is the internet, and now full-text search technologies look set to change our desktops in much the same way.

Google has lead the charge with their Google Desktop Search, a free tool that scans and indexes your documents, emails, viewed web pages, and even IM logs, making them ready for near-instant searching.

Linux is gaining even more advanced searching through Beagle, a search engine with modular indexing that applications can easily plug their own data in to. Beagle brings Google-style searching to the Linux desktop, but it doesn't stop there. Dashboard, a query tool that runs on top of Beagle, can monitor your activity, automatically displaying relevant data from its indexes. For instance, typing an email address in to an IRC conversation might bring up that person's details from your contacts database, along with a list of recent emails from them.

Microsoft have done some work in this area, calling the idea 'implicit query', but it's currently tied to WinFS, and so won't be with us for some time yet.



What it is: **Linux: Desktop revolutions**
When is it coming: **This year**

Not to be left behind by Longhorn, Linux is well on the way to a few desktop revolutions itself. The coolest part is that, thanks to its open development model, you can start playing with some of these goodies today.

Major efforts are currently underway to overhaul just about every component in the Linux GUI pipeline, from the X server and drivers through to the drawing layer, GUI toolkits, window managers, and applications.

The biggest changes revolve around Cairo, a powerful vector-based drawing toolkit that gives developers great flexibility, with smooth rendering of fonts, curves, images, and other objects. The GTK+ GUI toolkit featured at the heart of the GNOME desktop is currently being ported to Cairo, exposing its power to both application developers and the toolkit developers themselves.

Beyond Cairo, the X server itself is seeing major changes. New technologies like the Composite extension are turning the desktop in to a virtual canvas, allowing all sorts of advanced window effects. The X Render allows for hardware acceleration of high-level drawing and blending tasks, perfect for accelerating both Composite extension effects, and Cairo based applications.

OpenGL also plays a big part in the future Linux desktop. Not only does Cairo support OpenGL acceleration through the Glitz library, but work is progressing on Xgl, an X server that uses OpenGL for every drawing operation. While it's only an experiment for now, it could pave the way for more widespread GPU utilisation in the desktop, and thus compete with Longhorn in what will be a future of not only useable desktops, but highly intuitive and pretty ones too.

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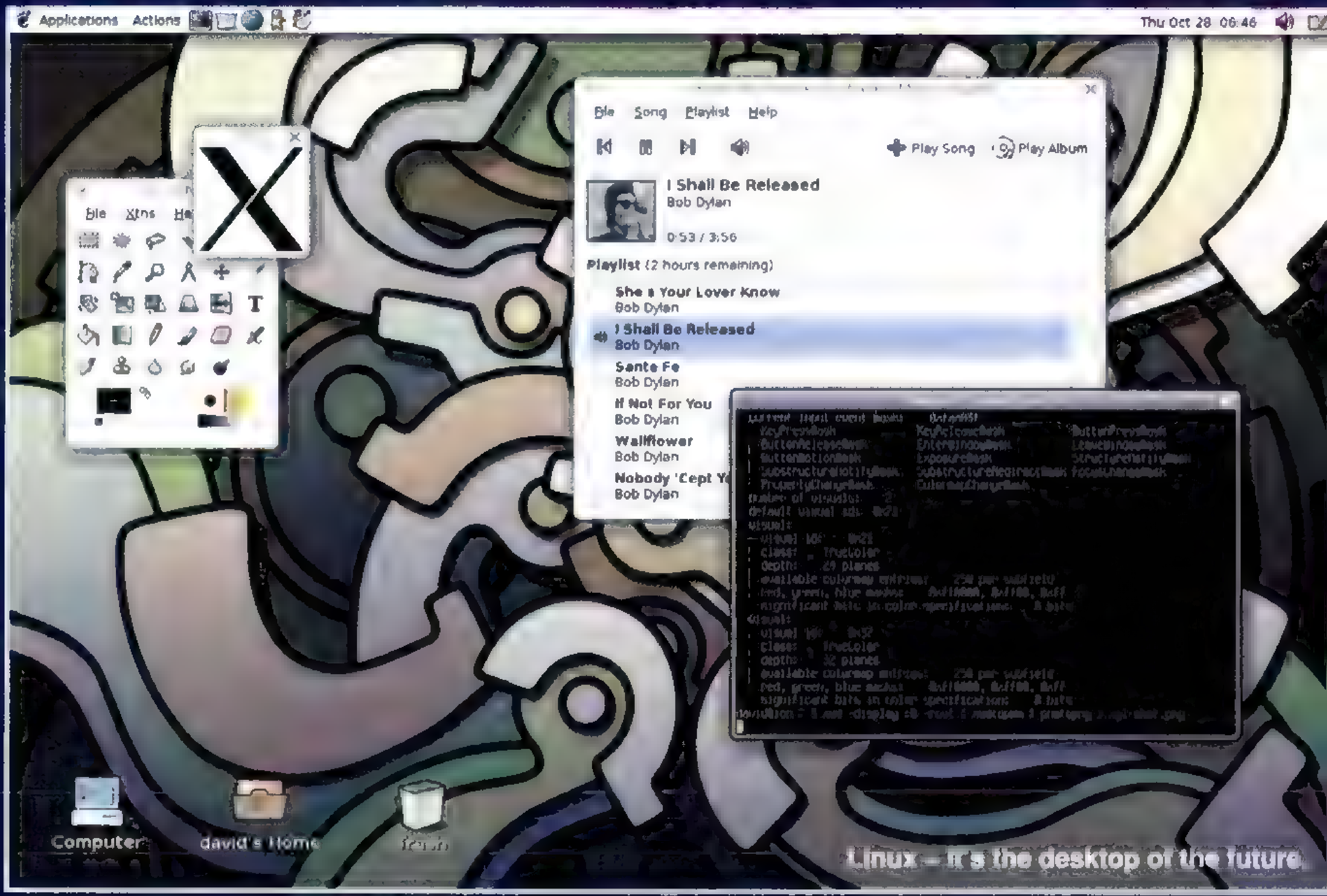


Linux – it's the desktop of the future.

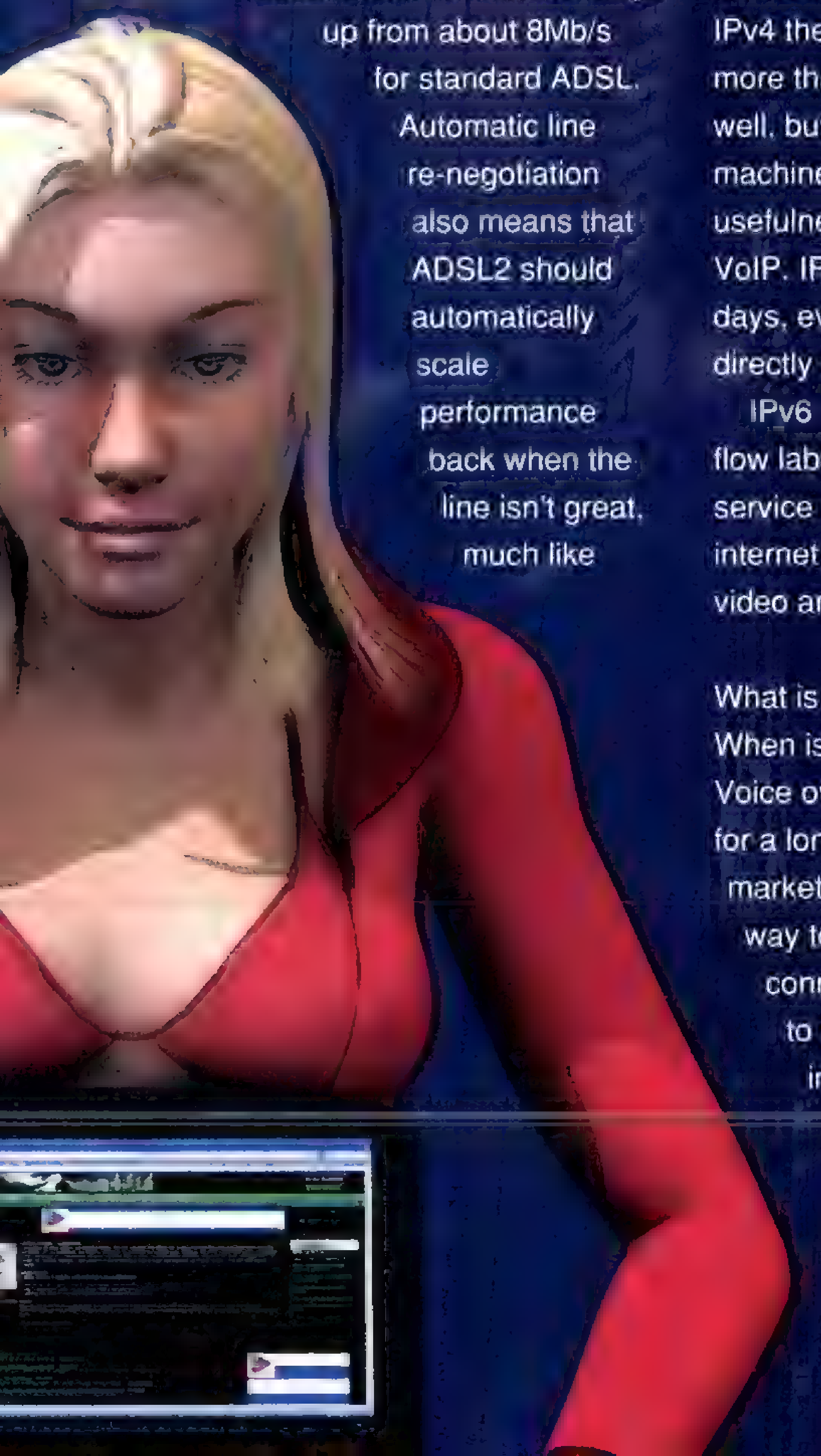
On the net

Not to be left out, networking advances promise to revolutionise how we and our PCs interact with the world. Now a core component of all systems, networking is the lifeblood of information communication. So what will you be using in years to come?

What is it: **Next-generation ADSL**
When is it coming: **2006-2007**
ADSL has been with us for a few years now, but the next year or two will see big changes in our ADSL infrastructure. Until recently, Telstra has ruled ADSL with an iron fist, but a number of providers, including iiNet, iPrimus, and Agile (Internode), are installing their own DSLAMs into exchanges, starting in the CBDs of Melbourne, Sydney and Adelaide. ISPs using these altenative DSLAMs bypass Telstra's ADSL infrastructure completely, and are promising greater bandwidth at lower prices as a result. This is avalable today if you're lucky enough to live in a covered area, but this year should see much wider rollout into suburban areas.

The Next Big Thing is ADSL2, which various providers are already experimenting with. Maximum ADSL speeds depend entirely on how far away from the exchange you are, but ADSL2 offers a maximum of 12Mb/s within about 2.5km of the exchange, up from about 8Mb/s for standard ADSL. Automatic line re-negotiation also means that ADSL2 should automatically scale performance back when the line isn't great, much like a 56K modem, rather than dropping out like ADSL. ADSL2's improved signalling boosts the maximum range as well – the Reach-Extended variant allows connections as far as 7km from the exchange.

Agile's DSLAM network is already using ADSL2, but Telstra are planning to skip straight to ADSL2+ in 2006, with a theoretical 24Mb/s within about 1.5km of the exchange.



What is it: **IPv6**
When is it coming: **2008-2010**
IPv6 has been the Next Big Thing for a long time now – the IETF settled upon it as the successor to IPv4 way back in 1994 – but its time will be coming in the next five years. IPv6 promises make the Internet more scalable, and more capable of handling new and different applications.

The biggest change in IPv6 is the increase in address space. Gone is the current 32-bit IP address, replaced by a 128-bit monster that's usually written in a hexidecimal form, with eight blocks of four characters. 128-bit addressing gives IPv6 2^128 – or roughly 3.4 x 10^38 – addresses, equivalent to 6.7 x 10^17 addresses for every square mm of the Earth's surface.

However, the widespread adoption of NAT has alleviated much of the stress surrounding IPv4's limited 4 billion address space, giving IPv4 the ability to handle an internet containing more than 4 billion machines. NAT works well, but it makes addressing individual machines virtually impossible, limiting the usefulness of technologies like file sharing and VoIP. IPv6 will ensure that, just like in the old days, every machine on the internet will be directly addressable.

IPv6 also has other new features, such as flow labelling for improved handling of quality of service needs, which will become vital once the internet starts carrying more streamed data, like video and VoIP.

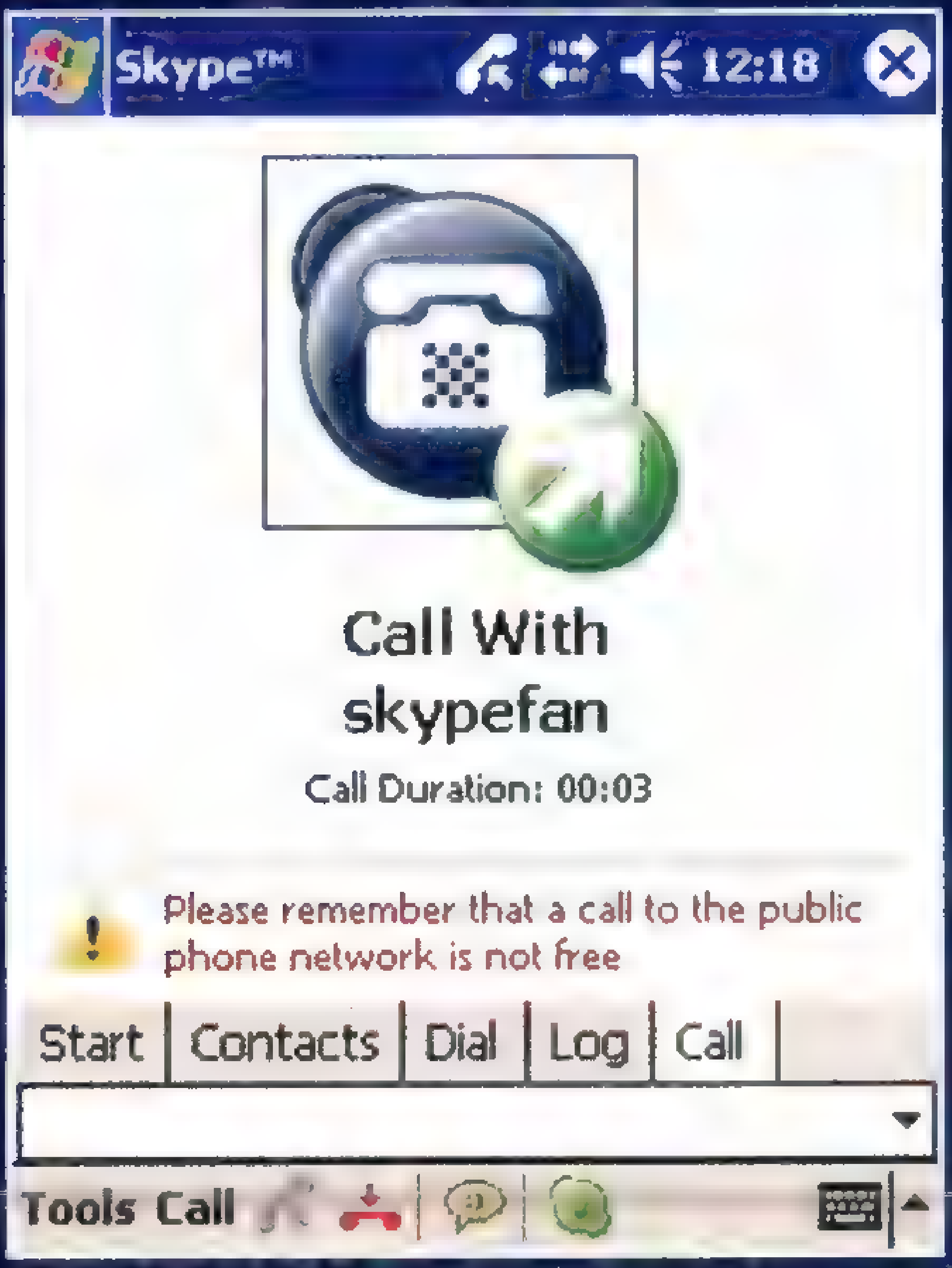
What is it: **VoIP**
When is it coming: **2006-2007**
Voice over IP has also been in the making for a long time, but it's now starting to hit the market with a vengeance. VoIP began as a way to make long-distance calls to internet-connected friends for the cost of a local call to your ISP – great in theory, but limited in practice.

Today, VoIP services are available through a number of providers, with hooks into the traditional telephone system, so you can make long-distance calls to your non-tech-savvy friends and relatives at local call prices. You don't even need a computer, with physical VoIP phones and adapters for existing phones available. Commpanies have been early adopters, with many deciding to forego a traditional PABX setup and run a single IP network carrying both their data and voice communications.

Skype has put PCs back on the VoIP map as well, with a free client and their SkypeOut service offering cheap calls to landlines around the world. More interestingly, Skype is now available for Pocket PC, and Skype are teaming up with Motorola to deliver somewhat of a technological wet dream – cheap VoIP calls on your mobile through Wi-Fi hotspots.

What is it: **WiMAX**
When is it coming: **2005-2006**
Wide-area networking is getting a good kick in the pants thanks to WiMAX, a wireless networking technology with a theoretical range of up to 50km. Broadband wireless is currently in its infancy, with services like iBurst using proprietary protocols, but WiMAX, or 802.16, is a superior technology and a ratified standard, which should lead to greater adoption.

WiMAX isn't a replacement for traditional 802.11 wireless LANs, but it should compliment them, offering providers a handy wireless method of feeding their 802.11 hotspots. More commonly, 2005 should see WiMAX powering home and business broadband connections throughout metropolitan areas, particularly in areas unable to connect to ADSL.



Call With skypefan
Call Duration: 00:03

Please remember that a call to the public phone network is not free

Will VoIP replace POTS? Maybe.

Lock down

Despite the fast pace of technology, and the advance of society with it, PC security will remain an important concern.

And not just from software-based threats. PC theft is surprisingly common. Just this year in March, a laptop containing over 98,000 student records was stolen from the University of California in Berkeley, US.

Unfortunately, it will take more than just one technology to solve our security woes.

'Security is all about building layers of protection – no one solution can prevent all problems,' says Clain Anderson, director of security and wireless at IBM's PC Division in the US. Currently, IBM has integrated sophisticated fingerprint scanners into its ThinkPad series of notebooks, among other security features. Of course, fingerprints are just the beginning. Retinal, and even DNA scanners, are very possible.

What is it: **Fingerprint scanners**
When is it coming: **Now**

Biometric fingerprint readers are available right now. You can buy them as a peripheral that connects via USB, and IBM includes readers on its ThinkPad series of notebooks. However, the technology is not perfect. Optical (CCD) scanners, which take a photo of the fingerprint, and capacitance scanners, which use capacitance to detect fingerprint *minutiae*, are the two most popular systems.

CCD scanners need to take a clear photo of the print, and can themselves be fooled by a photograph. Capacitance scanners, on the other hand, are much harder to trick – you'd need a mould of the fingerprint to deceive it, as it detects where the ridges and grooves of the finger touch the plate. For now, the technology is suitably advanced that it's being used in products, but it will continue to evolve in the coming years.

What is it: **Retinal scanners**
When is it coming: **2005-2010**

'The iris of your eye can be read by many common cameras, which makes iris recognition a real possibility for authentication sometime in the future when cameras become more common on PCs,' says Anderson.

Retinal or iris scanners are the next step from fingerprint scanners. Ideally an iris scanner would be integrated seamlessly into a laptop device, making verification 'invisible'.

Of course, like fingerprints, retinal scans would be enhanced via another system, such as a card or password. Regardless, iris scanners have an uphill battle to win.

'I doubt that retina scanners will ever become widely accepted due to consumer concerns about their invasive nature,' says Anderson.

More than a PC

The future of computing is not the sum of what we've discussed here, though it's bound to use many of its elements. The evolution of our beloved components is seeing new boundaries being crossed that were previously thought impossible.

The future will have a new topology, beyond just the coupling of CPU, GPU and memory. It will be beyond the improvement of bandwidth and networks, and beyond Moore's Law. While the underlying technology will undergo great changes, the use of computers will undergo a similar revolution.

Initially, the PC was just another electronics toy for the enthusiast. Then it became a typewriter and a digital spreadsheet. Multimedia came along and it became a music player and game machine. With the internet it has become all that and an information hub. One thing about future PCs are certain – their roles will continue to diversity.

In the coming years, the concept of the home server will become increasingly prevalent. With the home server, the PC and the TV centred living room will at last be intimately connected (ironically, it's not some magic processor that sparked this possibility, but simply Wi-Fi.) Media content from music to movies will be hosted on the PC and accessible from various clients around the house. Microsoft's Media Centre 2005 gives a glimpse of where we're heading. Indeed the personal computer as we know it will be transformed into a device to download, record, store and transmit entertainment and other forms of information content.

Next generation consoles will also aim to take over as the digital hub. Xbox Next and Playstation 3 are likely to be very disruptive to the existing landscape; everything from PVRs to DVD players will be threatened. Due to their massive computing power and emphasis on networking, next generation consoles are serious contenders against the PC for the right to host the digital home.

These boxes will neither be traditional PCs nor classic consoles. Their hybrid architecture will give them numerous advantages. They will cost less than an entry level PC while having the computing power of a top of the line one. Given time, software written for them will be highly optimised and exploit all that the hardware has to offer. And games will run flawlessly without the need for upgrades. Above all, they will be network capable and internet ready. PCs ought to watch out; many people may forget about them in light of these killer next generation consoles.

Looking further down the pipe, the notion of client and server will melt away when a seamless, distributed operating system reaches the masses. Such an OS will be able to virtualise the computing resources of networks. Today, when something is slow, we blame our CPU. With a distributed OS, you won't know what to blame. Computation will be done everywhere, in the local CPU, on the network or even across the internet.

The benefits of the ideal distributed computing system are countless. Computing power is as large as the internet. Data redundancy and backup is transparent and automatic. Storage is essentially unlimited. The user will never have to perform physical upgrades again. Where there once was a line that clearly defined your computer and the outside world, now there is a blur. Companies like IBM and Microsoft are feverishly pursuing this vision. To realise this, much more work in distributed operating systems and distributed programming needs to be done. Bandwidth improvements will also be essential.

Ideally we want such future systems to use open standards. While grid computing, which allows different operating systems and hardware combinations to work together, has made great process in scientific and supercomputing fronts, it's unlikely to penetrate the consumer space.

This is because most grid computing tools run on top of the operating system rather than serve as one. We'll probably be stuck with Microsoft for sometime to come.

The computer of the future will live in a sea of networks. Both data and computation will flow dynamically across the network like water and electricity. The user of the future will have, in many ways, the whole world in their hands.

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Good as new!

'*Atomic* has made me a sex god. A sex *god*!'
– *Steve Urkel*

It might seem an unusual subject to write about in this month's Hardware tutorial, but if you excuse the pun it's a pristine topic. Gear builds up gunk, and gunk causes fans to operate with reduced efficiency, mice to start skiping on their pads, and monitors to lose clarity as layers of dust settle, among other problems. Poor airflow means more heat and ineffective overclocks, skipping mice means resorting to blaming lag when you get owned online, and what's the point of a beautiful and sharp LCD if you're going to let it be mired by grime? Like cars, PCs can benefit from a good old-fashioned cleanup. You can soak keyboards and motherboards to bring them up like new, clean out fans for improved airflow, and wipe down pretty much any surface to make it look spanktastically new. I know people who regularly clean their PCs, even if not their rooms! It's all good – priorities afterall. So roll up your sleeve's for Ron's unique tutorial this month and make your baby look and perform good as new again. – *Ed*

tutorialcontents

Windows 64
In Part 2 of Craig Simms' ultimate guide to the Windows command prompt he shows us how to build a big and beefy batch file to create a Hot Folder so hot it'll burn your pants just by using it. Really. Oh, and it's damn useful too! What more could you ask for? Master the prompt *and* do stuff with it!

Linux 68
A holy grail of computing is a combination of Windows' ease of use and featues with the stability and speed of Linux. The ultimate OS isn't here yet, but in the meantime you can run Windows and Linux side by side – or, if you want, on top of each other. This month Leigh Dyer shows you how to have the best of both worlds.

Hardware 72
A clean PC is a happy PC, as Ron Prouse demonstrates in this month's tutorial. While entertaining, dirt and strange growing organisms in your PC can impact performance, so it's good to give your box a spring clean every now and then.

If you have any suggestions for topics you'd like to see covered in Technique, drop us a line at **tutes@atomicmpc.com.au**

tinytweaks

Pushd a Popd

By default, you can't change directories to a remote machine from the command prompt and browse at your leisure, as it doesn't allow UNC paths. There is however a nice little exploit to overcome this. Open a command prompt, and change the directory to your remote machine like so: **pushd \\remotemachinename\sharefoldername**. Pushd will now temporarily mount the remote path as a drive – all commands should work normally. To return to the directory you changed from at any time, type **popd**. This can also be used for local directories, so you can essentially mark the current folder you're in by typing **pushd .** (yep that's a '.') and return to it at any time by typing **popd**, saving a lot of typing in the process.

Sudo-echo

Being able to switch to the root user inside an existing user login, using the **su** command, is incredibly handy, but the **sudo** command is even more convenient. Once installed and configured, you can use it to run individual commands as the root user: **sudo apt-get install foo** The great thing about sudo is that you don't use the root password at all. Your regular user password is used for authentication, and even then only occasionally – once you've entered it, it's remembered for a while. To keep things secure, sudo restricts the applications each user can run as root. You can edit the configuration file using the **visudo** command. It's normally safe to allow your regular user account access to any application, which you can do with a line like this in the configuration, inserting your own username: **username ALL=(ALL) ALL.**

Rinse and shine

Firstly, we should kill off a myth. Dishwashers are not a good place for PC components, and that may not be for the reason that first comes to mind. It's all about high temperatures and the corrosive nature of the powder/tablets that are used in them. Generally, dishwasher detergent packaging mentions that it is very unsuitable for some materials, especially non-ferrous metals such as lead and aluminium (even anodised). So what? Well, as an example, most ICs are soldered (lead) to a printed circuit board (PCB) by their aluminium legs. Anything that attacks and corrodes the lead and aluminium is going to have a very negative effect on performance and lifespan. Temperature is an obvious issue. Even ABS plastics such as keyboards will distort if they get hot enough!

Command & Conquer Part 2

Just like John Romero, Craig Simms wants to make you his batch. Or something.

The command prompt is a wonderful thing, and this month we're going to prove it by attempting something crazy – we're going to build a hot folder.

A hot folder is a folder that runs a process automatically whenever a file is dragged and dropped into it. In this case, we're going to make one that converts any MP3 file copied into it into an OGG. And we're going to use the command prompt as much as possible. Why? Because we can of course!

Right write

Our biggest problem is determining when there has been a successful write to the hot folder. Windows creates a 'placeholder' file before any file transfer begins, effectively ruling out a looping 'dir' command to look for changes as any subsequent code will attempt to process files before they are complete. The command would therefore fail because the files are locked, and result in pointless runs of the script. Not nice on the CPU – optimally we want a way to flag only successfully written files. Fortunately, one exists.

Head to Start –> Settings –> Control Panel –> Administrative Tools –> Local Security Policy, then choose Local Policies –> Audit Policy in the left pane. Double click Audit Object Access and check Success, then click OK. Now every time an object access is successful on a specified folder or file, it will be written to the Security Log. Close the window.

We need to disable Simple File Sharing to access per folder security settings, so open Explorer and select Tools –> Folder Options and hit the View tab. Uncheck Simple File Sharing and click OK.

Now we want to create our hot folder (for the sake of this article, we've called it 'Hot Folder'. and placed it on the desktop). Right click on it and choose Properties, the Security tab, then the Advanced button. Choose the Auditing tab, hit Add, Advanced and then the Find Now button to list the available users and groups on the local machine. Select the user/group whose actions you wish to monitor (most likely the currently logged in user), hit OK twice and a dialogue box will appear. Set it to apply to This Folder Only, and check the box for a Successful Create Files/Write Data instance. Hit OK on each successive dialogue until they are all closed.

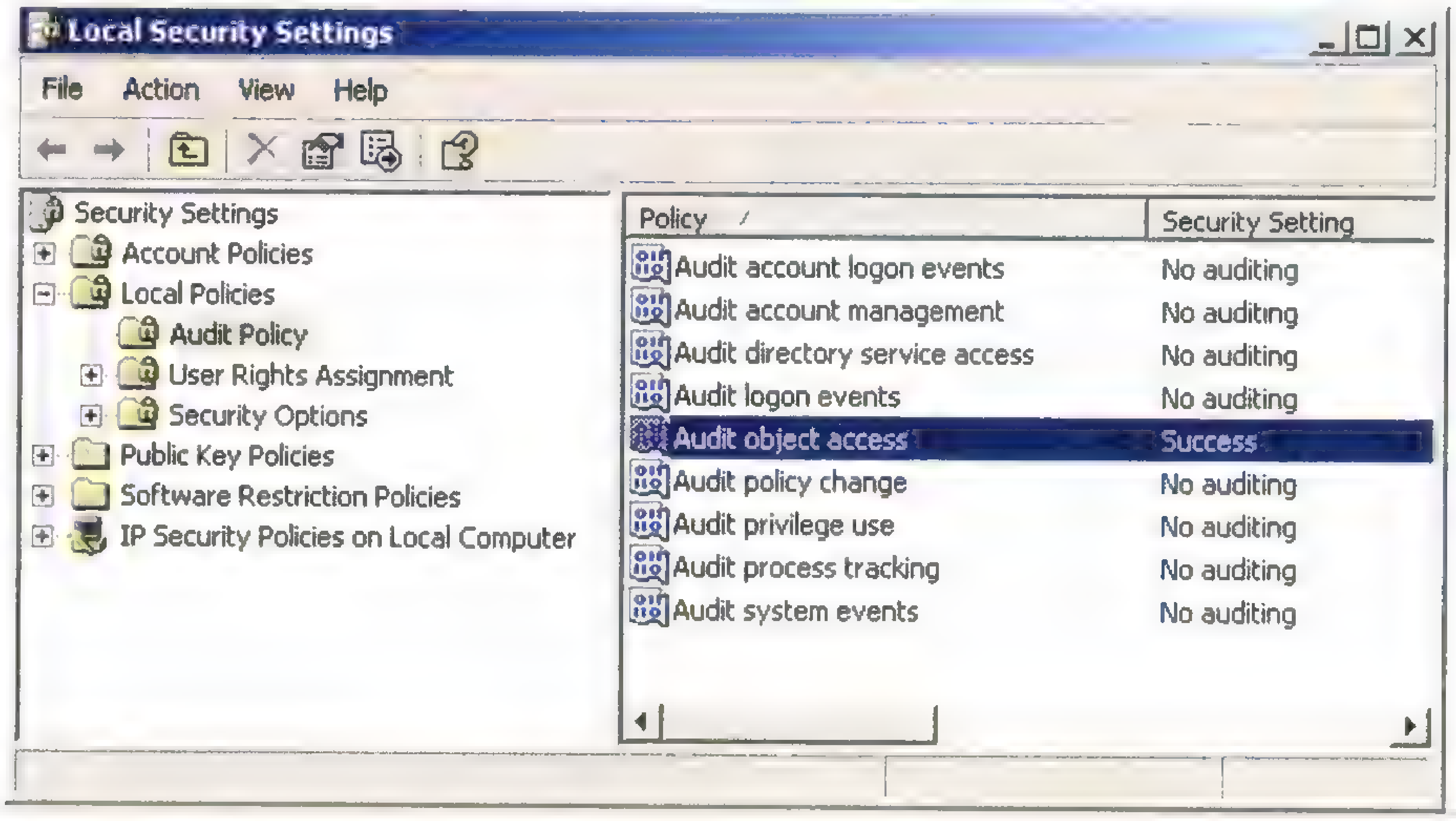
Go to Start –> Settings –> Control Panel –> Administrative Tools –> Event Viewer and choose Security from the menu tree. Drag and drop a file into the hot folder, switch back to the Event Viewer and hit F5 in the right hand pane. If everything is working correctly, you should have three new event ID entries – 560 (Create File), 567 (Write File) and 562 (Process Complete). Right click on Security, choose Properties, and set to Overwrite Events as Needed. Hit OK, then close the Event Viewer.

File prep

At this point it may be wise to have process.bat (included on the CD) open with a text editor while you're reading along with the article, as what follows is part exploration, part batch file. Create the directory 'c:\automation', and a text file within called 'time.txt'. Open it with notepad and enter:

```
02/20/2005,01:00:00AM
```

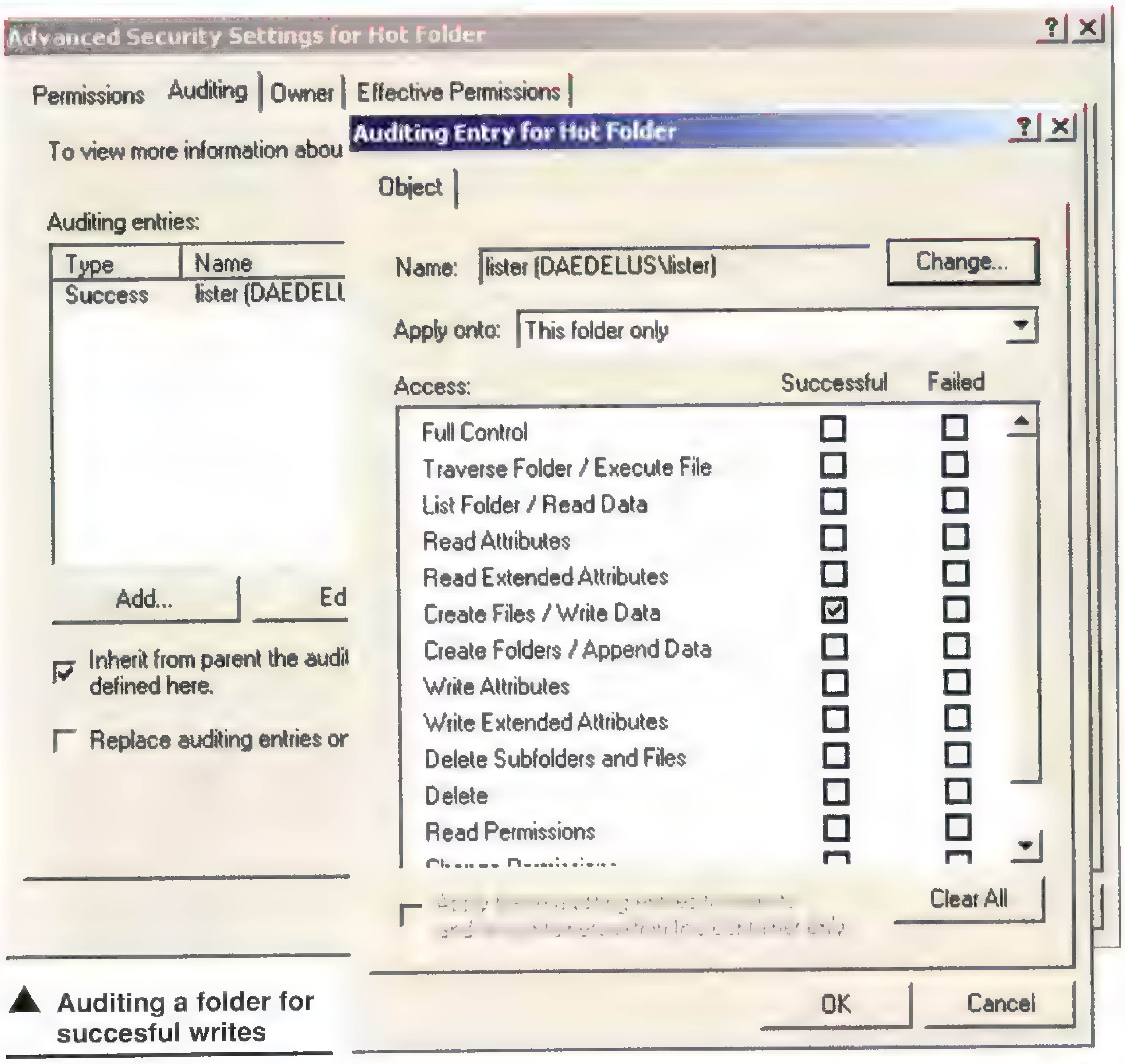
The date/time is unimportant, as long as it's before the present and the format remains intact. Open a command prompt, browse to



- Security Settings
  - Account Policies
  - Local Policies
    - Audit Policy
    - User Rights Assignment
    - Security Options
  - Public Key Policies
  - Software Restriction Policies
  - IP Security Policies on Local Computer

Policy	Security Setting
Audit account logon events	No auditing
Audit account management	No auditing
Audit directory service access	No auditing
Audit logon events	No auditing
Audit object access	Success
Audit policy change	No auditing
Audit privilege use	No auditing
Audit process tracking	No auditing
Audit system events	No auditing

▲ **Logging succesful object access events through the Local Security Settings Audit Policy.**


Advanced Security Settings for Hot Folder
Permissions
Auditing
Owner
Effective Permissions
To view more information abou
Auditing entries:
Type
Name
Success
lister (DAEDELL
Add...
Ed
Inherit from parent the audit defined here.
Replace auditing entries or
Auditing Entry for Hot Folder
Object
Change...
Clear All
OK
Cancel

Name: lister (DAEDELUS\lister)

Apply onto: This folder only

Access:	Successful	Failed
Full Control	☐	☐
Traverse Folder / Execute File	☐	☐
List Folder / Read Data	☐	☐
Read Attributes	☐	☐
Read Extended Attributes	☐	☐
Create Files / Write Data	☑	☐
Create Folders / Append Data	☐	☐
Write Attributes	☐	☐
Write Extended Attributes	☐	☐
Delete Subfolders and Files	☐	☐
Delete	☐	☐
Read Permissions	☐	☐

▲ Auditing a folder for succesful writes

the new directory and type:

```
set /p loctime= < time.txt
```

This sets the local variable 'loctime' to accept standard input (/p), in this case the previously created time.txt. This will serve as our reference point, of which more will be explained later.

Lumberjacking

We've overcome our first hurdle, detecting successful writes – however we have another problem – filtering out the noise that exists within the Security log. Some system processes are also monitored with identical event IDs to the ones we need, so it's time to do a little weeding.

```
cscript %systemroot%\system32\
eventquery.vbs /FI "id eq 560" /FI
"datetime gt %loctime%" /l security
/fo csv /v | findstr /i "explorer.exe
iexplore.exe cmd.exe firefox.exe" |
findstr /i ".mp3" > verbose.txt
```

For those who just had a minor heart attack, let's look at the command piece by piece. CScript is the Microsoft scripting host, and it's executing the VBScript 'eventquery', which will print the current Security log (/l security) to the screen, filtering (/FI) for all instances that are equal to event ID 560 and have a date/time greater than (gt) the variable loctime, outputting (/FO) it in a comma-delimited, verbose (/v) fashion.

Loctime is the time when the most recently processed file was created in the hot folder. This variable allows us to filter out any entries before that time – otherwise future runs of the script will attempt to process non-existent files from old logs.

Next we've piped our results through FINDSTR, which allows us to isolate lines containing predefined strings (including regular expressions – type **findstr /?** for a quick reference). Here we've looked for lines that contain the case insensitive strings (/i) 'explorer.exe', 'iexplore.exe', 'cmd.exe' or 'firefox.exe'. We've then piped all that through FINDSTR again for '.mp3' – so any time IE, Explorer, the command prompt or FireFox writes an MP3 to the hot folder, we'll know about it. This opens up some wonderful possibilities – for example, you could modify the script later to send an email to your work that notifies when your latest pr0n movie has finished downloading at home.

After all that, we've output the filtered results to verbose.txt.

Strip club

We now need to extract the timestamp for the loctime variable. This is where FOR comes in.

FOR is an incredibly powerful command that analyses standard input and performs an action based on content within that input.

For example:

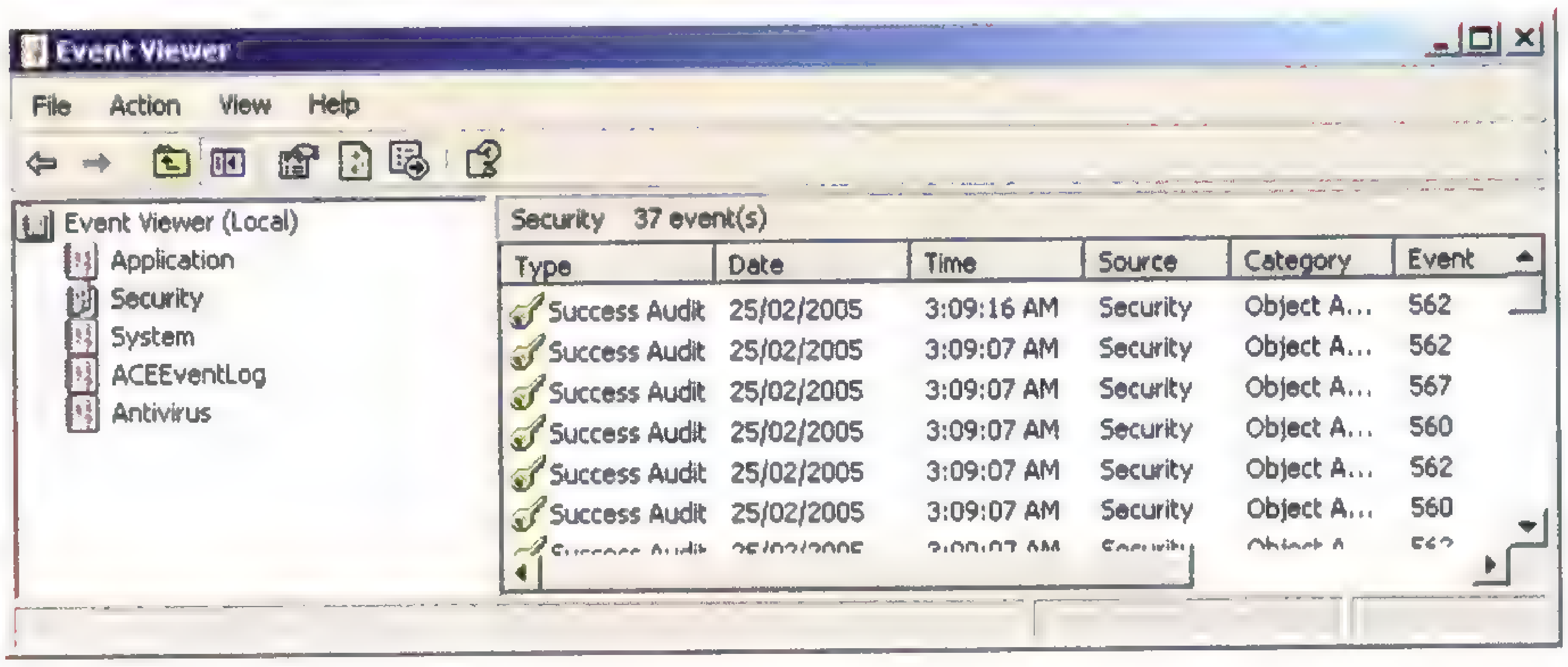
```
for %a in (*.*) do @echo I am %a!
```

Says for every variable (%a – in this case, each file in the current directory) amongst all files in this directory ((*.*)), echo to the screen **I am filename!** Give it a try. Note that in batch files, all FOR variables (%a) require double percentage signs (%%a).

So FOR is useful for processing files – however it can also process data, so we'll be using it to analyse our log entries and strip out what we need (continue on next page):

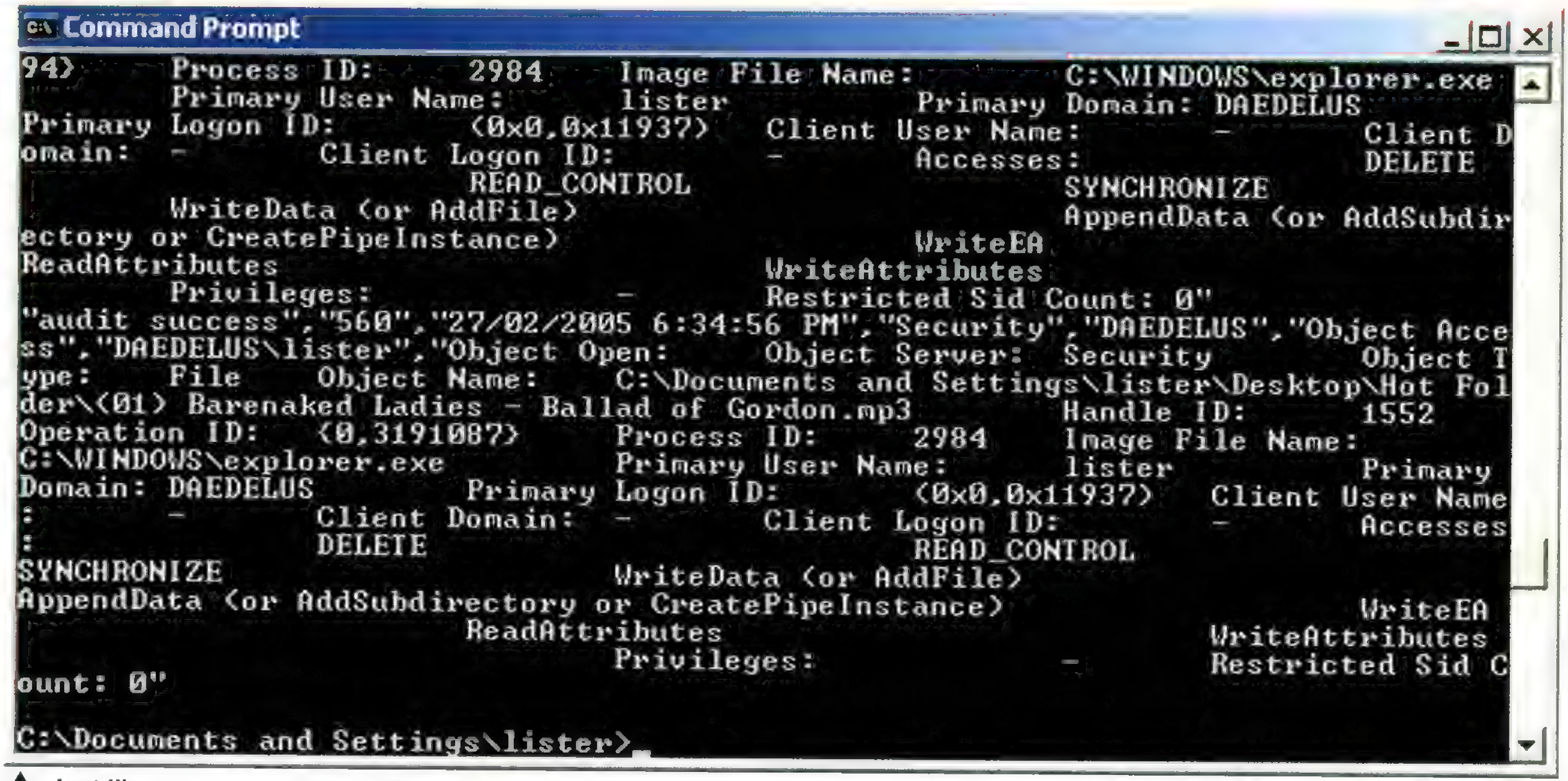
```
for /f "usebackq tokens=3 delims=,"
%a IN (`type verbose.txt`) DO @ECHO
%a>> sort.txt && sort < sort.txt
```

→



Type	Date	Time	Source	Category	Event
Success Audit	25/02/2005	3:09:16 AM	Security	Object A...	562
Success Audit	25/02/2005	3:09:07 AM	Security	Object A...	562
Success Audit	25/02/2005	3:09:07 AM	Security	Object A...	567
Success Audit	25/02/2005	3:09:07 AM	Security	Object A...	560
Success Audit	25/02/2005	3:09:07 AM	Security	Object A...	562
Success Audit	25/02/2005	3:09:07 AM	Security	Object A...	560

▲ The Event Viewer is our friend. It also allows us to view the event logs.



```
94)      Process ID:      2984    Image File Name:        C:\WINDOWS\explorer.exe
         Primary User Name:       lister          Primary Domain: DAEDELUS
Primary Logon ID:        (0x0,0x11937)   Client User Name:       -       Client D
omain:  -        Client Logon ID:        -       Accesses:               DELETE
                         READ_CONTROL                           SYNCHRONIZE
         WriteData (or AddFile)                                 AppendData (or AddSubdir
ectory or CreatePipeInstance)                           WriteEA
ReadAttributes                                  WriteAttributes
         Privileges:             -       Restricted Sid Count: 0"
"audit success","560","27/02/2005 6:34:56 PM","Security","DAEDELUS","Object Acce
ss","DAEDELUS\lister","Object Open:     Object Server:  Security        Object T
ype:    File    Object Name:    C:\Documents and Settings\lister\Desktop\Hot Fol
der\(01) Barenaked Ladies - Ballad of Gordon.mp3        Handle ID:      1552
Operation ID:   {0,3191087}     Process ID:     2984    Image File Name:
C:\WINDOWS\explorer.exe         Primary User Name:      lister          Primary
Domain: DAEDELUS        Primary Logon ID:       (0x0,0x11937)   Client User Name
:       -       Client Domain:  -       Client Logon ID:        -       Accesses
:       DELETE                          READ_CONTROL
SYNCHRONIZE                     WriteData (or AddFile)
AppendData (or AddSubdirectory or CreatePipeInstance)                   WriteEA
                        ReadAttributes                          WriteAttributes
                                Privileges:             -       Restricted Sid C
ount: 0"

C:\Documents and Settings\lister>_
```

▲ **Just like your pool, without filtering everything turns into crap!**

```
> sorta.txt && for /f “usebackq
tokens=1,2,3” %b IN (`type sorta.txt`)
do @echo %b,%c%d> sorta.txt
```

As MC Hammer once said, break it down! /f indicates we're parsing either a string or the output of a command, rather than files Then comes the settings for /f – usebackq indicates that anything contained within the parentheses that is between backquotes (the symbol that is on the same key as ~) is to be executed as a command, whereas anything between quotation marks is a literal string. A token is whatever data appears between delimiting characters – for example, by default the delimiting characters are space and tab, so in the line

```
Atomic r0x0rs your b0x0rz
```

'Atomic' is considered the first token, 'r0x0rs' the second and so on. So in the code above we are telling FOR to only pull the 3rd token found in verbose.txt, using commas as delimiters (delims).

Since FOR is essentially a loop, we need to append to a file rather than write, or else the latest data loop will overwrite the previous one. The date/times are also in the wrong order needed to isolate the latest date, so we've reversed the order through SORT, making the latest date appear at the bottom of the file.

Finally we've put our sorted file through FOR again, used spaces as delimiters, processed the first three tokens and written them (%b,%c%d) to a file in a format closer to the order we need

String theory

So now we have the date/time in the format **"dd/mm.yyyy,0:00:00xM"**, but we need it in **mm/dd/yyy,00:00:00xM**. Since we're altering a single line, we can use SET to perform the required string operations

```
set /p datetime= < sorta.txt
set datetime=%datetime:”=%
```

Here we've injected the variable datetime with the contents of sorta.txt. We are then setting the variable to itself, but stating that we want all quotation marks to equal nothing. We can fix our preceding zero problem in a similar manner:

```
set datetime=%datetime:,1:=,01:%
```

Obviously we'd add extra lines to cover hours 2 to 9. Now we need to swap the date and month.

```
set ddstrip=%datetime:~0,2%
set mmstrip=%datetime:~3,2%
set datetime=%datetime:~5,16%
set datetime=%mmstrip%/
%ddstrip%%datetime%
echo %datetime%> time.txt
```

Here we have told SET to create the variable ddstrip from datetime, but only use the first two characters (,2) after entry point zero (~0). We've done the same for the month, then stripped those characters from the datetime variable, and joined them all together again in the order we want. Finally, we have exported the updated datetime to time.txt.

Line dancing

Now we need to extract the file names we want to process

```
for /f “usebackq tokens=8 delims=:” %a
IN (`type verbose.txt`) DO @ECHO C:
%%a>> list.txt
```

Problem: we still have the MP3 extensions, and we have a trailing string (<SPACE><SPACE><TAB>Handle ID). SET can't do the work for us, because list.txt will be multi-line at some point. Enter edlin – the Microsoft Line Editor. Replacing <SPACE> with the space bar, <TAB> with the tab button, ^Z with the F6 button and ^C with CTRL+C, type:

```
edlin handrem.ed
1i
1,9999 r<SPACE><SPACE><TAB>Hand
le ID^Z
1,9999 r.mp3^Z
```

```
1,9999 r.Mp3^Z
1,9999 r.mP3^Z
1,9999 r.MP3^Z
▯
^C
e
```

This set of commands creates and opens the file handrem.ed in edlin, then enters insert mode at line 1 (1i). Next, for lines 1 through 9999, we are telling edlin to replace the string '<SPACE><SPACE><TAB>Handle ID' with nothing (anything that follows ^Z will replace the preceding string). We are then stripping all instances and variants of '.MP3', then telling edlin to write the file and exit. Finally we are exiting insert mode (^C), writing handrem.ed and exiting edlin. Now when we run edlin on list.txt, the changes are made automatically for us.

```
edlin list.txt < handrem.ed
```

Cleaning house

All that's left is to prepare the files for conversion. Grab BeSweet from **www.doom9.org** and extract it into the c:\automation\besweet directory.

```
for /f "usebackq tokens=1,2,3,4,5,6
delims=\" %%a IN (`type list.txt`) DO
move /y "%%a\%%b\%%c\%%d\%%e\
%%f.mp3" "%%a\%%b\%%c\%%d\%%e\
original"

for /f "usebackq tokens=1,2,3,4,5,6
delims=\" %%a IN (`type list.txt`) do
c:\automation\besweet\BeSweet.exe
-core( -input "%%a\%%b\%%c\%%d\
%%e\original\%%f.mp3" -output "%%a\
%%b\%%c\%%d\%%e\wavs\%%f.wav"
-2ch -logfilea "c:\automation\besweet\
besweet.log" )

for /f "usebackq tokens=1,2,3,4,5,6
delims=\" %%a IN (`type list.txt`) DO
START /low c:\automation\besweet\
BeSweet.exe -core( -input "%%a\
%%b\%%c\%%d\%%e\wavs\%%f.wav"
-output "%%a\%%b\%%c\%%d\
%%e\output\%%f.ogg" -logfilea "c:
\automation\besweet\besweet.log" )
-ota( -norm 1 ) -boost( /b=2db ) -ogg( -q
0.750 ) -profile( The OagMachine v0.11 )
```

Here we are moving the MP3s into a subfolder called 'original', converting them to WAV (some MP3s will crash a direct MP3 > OGG conversion) in the subfolder 'wavs', then finally converting the WAVs to OGG in the 'output' subfolder. Note that the OGG conversion is executed with START /low. This will execute the process as low priority. One side effect of this is that the batch file will not wait for the START command to finish – so we have to be careful what we execute afterwards.

Now we want to clean up all the temporary files we've used:

```
del list.txt
del verbose.txt
del sort.txt
del sorta.txt
del *.bak
```

Then at the top of the file, we want to insert a command to delete any previously used WAV files, which will be executed next time the script runs. We can't include it with the rest of the clean up, or the WAV file will be deleted before BeSweet has a chance to convert.

Finally, there's no point running the whole script if there are no MP3s in the folder:

```
dir "c:\documents and settings\
username\desktop\hot folder\*.mp3" ||
goto end
```

Here, if no files are found, the batch file will jump to the section labelled ':end', which we'll appropriately place at the end, so no other commands are executed.

Trigger happy

Last step! We now set the trigger to launch our gargantuan batch file.

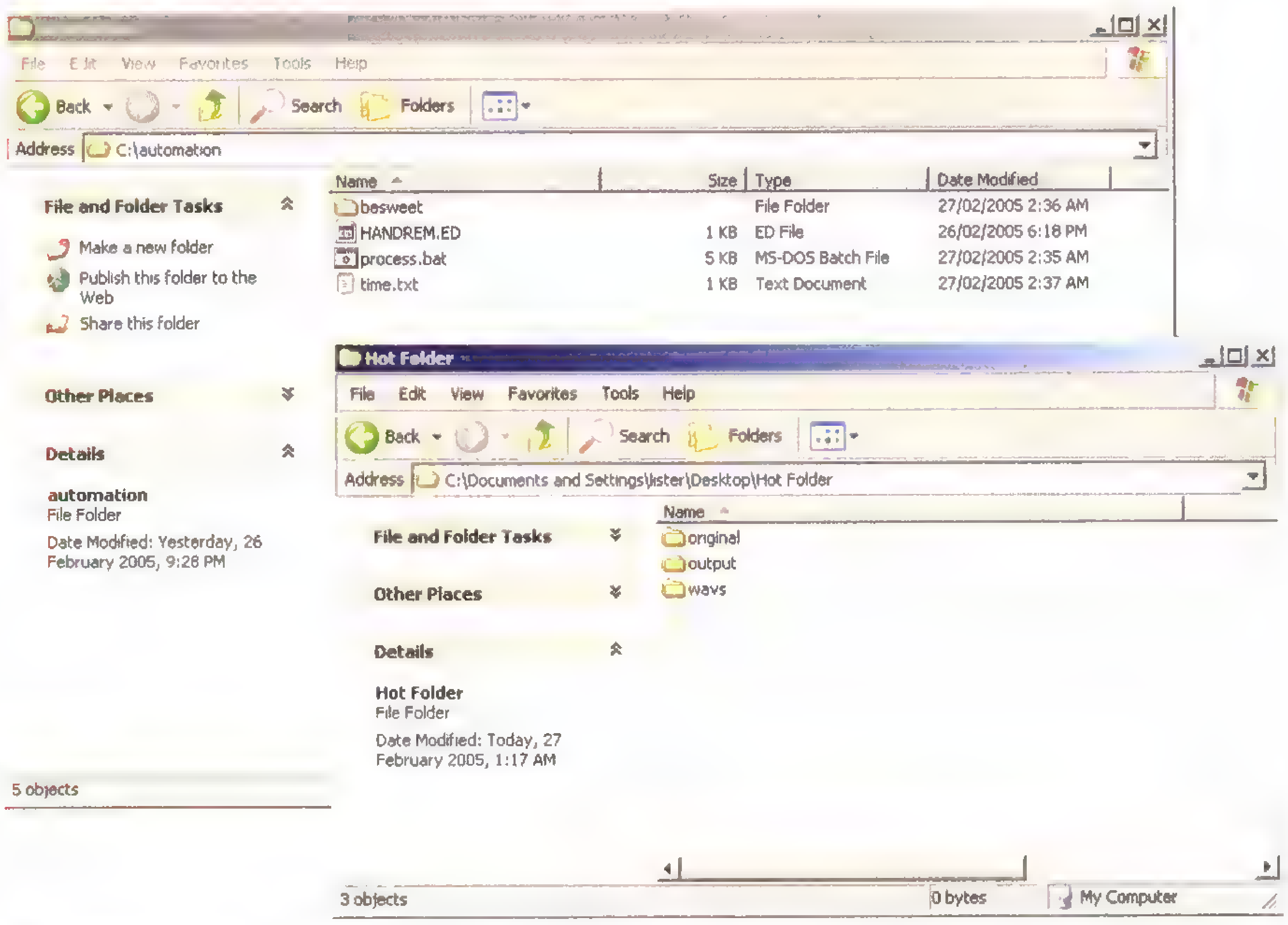
```
eventtriggers /create /TR "MP3 2 OGG
Hot Folder" /EID 562 /L security /TK "c:
\automation\process.bat"
```

/TR is our friendly name, /EID the process it is interrupting (in this case the 'successful completion' process), /L indicates which log it checks and /TK is the program it executes whenever the appropriate event ID is detected. You can add a /RU to the end followed by your user name if you wish to see the output (useful for bug testing), or alternatively leave it off for it to be run as a system process, for which its only evidence of existence will be in the task manager.

Final considerations

There are still some problems that remain – the script will only react if a file is copied into the folder, or moved from another partition. Due to logging limitations, it won't react to files moved from the same partition. Further, at this point identically named files will be overwritten – we've left that much for you to solve with your new found skills.

You could even extend on the script to move files into folders based on artist names – the possibilities are limitless thanks to the power and flexibility of the Windows command prompt!



Address C:\automation

Name	Size	Type	Date Modified
besweet		File Folder	27/02/2005 2:36 AM
HANDREM.ED	1 KB	ED File	26/02/2005 6:18 PM
process.bat	5 KB	MS-DOS Batch File	27/02/2005 2:35 AM
time.txt	1 KB	Text Document	27/02/2005 2:37 AM

automation
File Folder
Date Modified: Yesterday, 26 February 2005, 9:28 PM

5 objects

Hot Folder

Address C:\Documents and Settings\lister\Desktop\Hot Folder

Name
original
output
wavs

Hot Folder
File Folder
Date Modified: Today, 27 February 2005, 1:17 AM

3 objects
0 bytes
My Computer

▲ **The hot folder in action – hot damn that's sexy!**

Virtually yours

Leigh Dyer delves deep into the world of emulation, and the awesome power that it brings.

Linux handles most things you can throw at it these days, but for most of us, the odd need for a Windows system just can't be helped. Back in the old days the only way to have multiple operating systems on the one PC was to dual-boot, but rebooting just to open a stubborn self-extracting archive or view a file in some non-free format gets old very quickly.

The ideal solution is to run Windows and Linux at the same time, and thanks to apps like VMware that's been possibile for quite a while now. VMware is an implementation of *virtualisation*, a concept that Intel and others have been thrashing around quite a bit lately. Virtualisation lets you partition your system, running multiple operating systems (or multiple copies of the same OS) at once. The Windows-plus-Linux scenario is obviously a great use for it, but there are many others – high-end Sun and IBM gear have been using virtualisation for years to consolidate machines and isolate potentially insecure services.

The trouble with VMware is its cost – if you're like us, with a random assortment of PC parts around the house, you could probably throw together a cheap Athlon XP box for not much more than the cost of a VMware license. The only free alternative until recently was Bochs, a PC emulator that will run Windows, but so slowly that there's really not much point. There's a new free alternative now though, and its name is QEMU.

QEMU

QEMU is a PC emulator, like Bochs, but its CPU emulation uses a technique known as dynamic recompilation to dramatically improve performance. Where Bochs translates CPU instructions one at a time, QEMU translates entire blocks of code at once, caching the translated code to be re-executed the next time the virtual CPU hits that block. Since most computer applications have the CPU executing the same code over and over again, the net result is that QEMU spends much less time translating code, and a lot more time running it.

Beyond the CPU, it also emulates the other bits of hardware that make up a PC. The exact list of components includes:

- i440LX chipset, including the PCI bus and IDE controllers
- Cirrus Logic GD-5446 PCI video card
- NE2000 (Realtek 8029-compatible) PCI network card
- PS/2 keyboard and mouse
- Optional Soundblaster 16 ISA sound card

QEMU is much faster than Bochs, but it's still no speed demon, with CPU performance roughly equivalent to a K6-233 on an Athlon 64 3200+. It's quick enough to be useful for simple tasks though, and the CPU emulation means that QEMU isn't tied to running on x86 systems, so it runs quite happily on PowerPC Linux systems.

However, the virtualisation module for QEMU changes all this. Called KQEMU, it's a kernel module that lets QEMU catch requests to access privileged chunks of RAM. With memory access requests being transparently translated by the kernel, QEMU doesn't need to translate most code segments – it can simply execute them as-is, resulting in near-native speed. Various low-level x86 operations can't be executed inside the protected environment of an operating system, but QEMU simply hands such code blocks over to its CPU emulator.

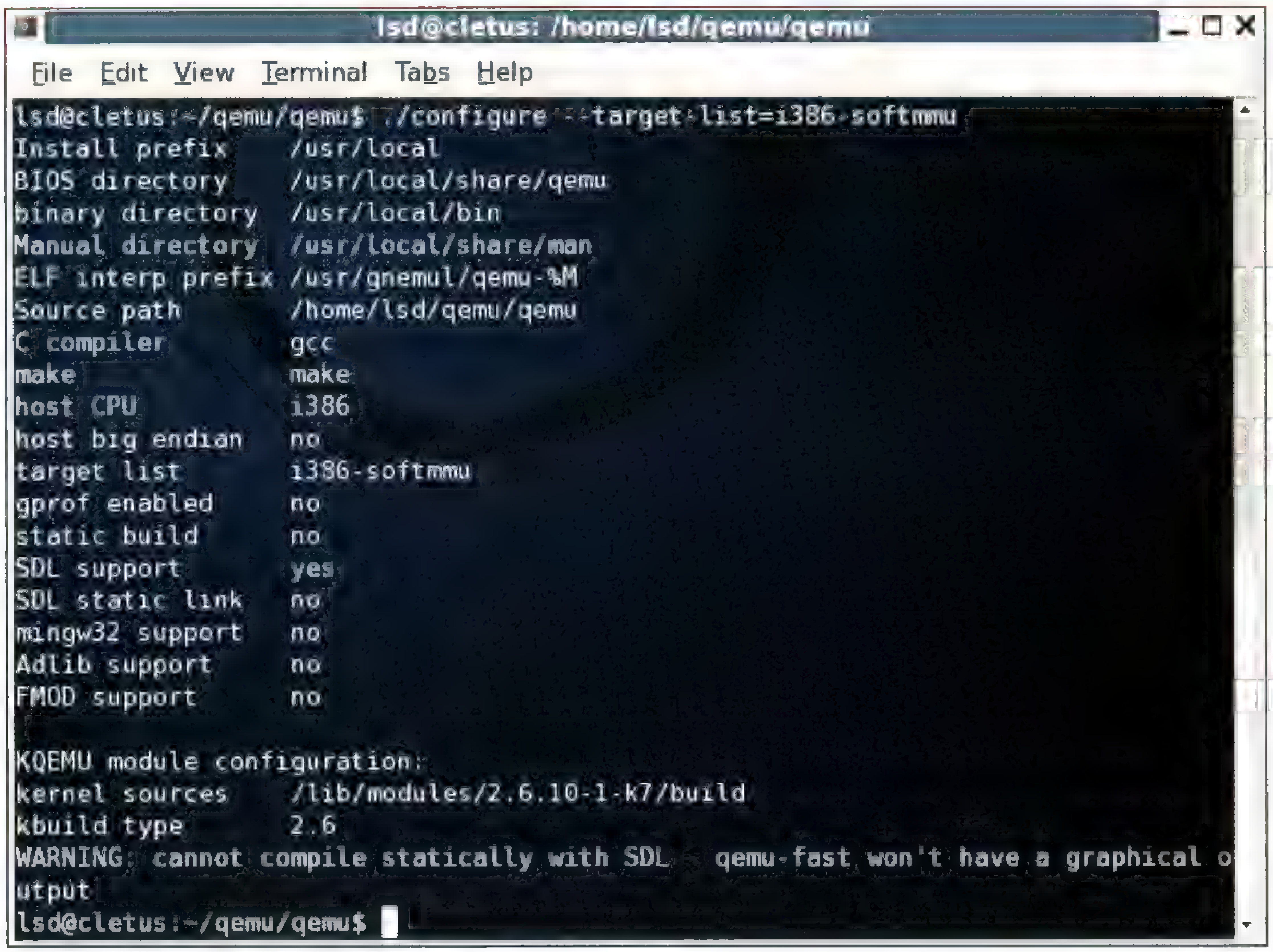
The only problem with QEMU's virtualisation

thevmwarefactor

QEMU is definitely the best free way to run a full Windows system under Linux, but VMware still thoroughly whips it in a number of ways. In terms of ideal CPU performance, they're both within spitting distance of native performance, but VMware has more advanced emulated hardware, including a 100Mb network controller (QEMU's NE2k is of course limited to 10Mb/s), a PCI sound card, and a custom video card system that uses special drivers to provide the virtual PC with a near-direct route to your display. This makes VMware feel more snappy for interactive work.

VMware has some other neat features too, such as support for USB devices and direct disk access for reading things like DVDs, VCDs and audio CDs. It's also a much more polished product – everything just works for the most part, with no odd bugs cropping up.

It's important to remember though that QEMU is still quite young, and I'm sure there are big plans for the future. The fact that it's already come so far seems to indicate that it's only going to keep closing in on VMware in the future, and for most people, it's more than usable enough even in its present state. But most importantly, VMWare is a commercial product that costs money, whereas QEMU is free.


lsd@cletus: /home/lsd/qemu/qemu
File Edit View Terminal Tabs Help

```
lsd@cletus:~/qemu/qemu$ ./configure --target-list=i386-softmmu
Install prefix    /usr/local
BIOS directory    /usr/local/share/qemu
binary directory  /usr/local/bin
Manual directory  /usr/local/share/man
ELF interp prefix /usr/gnemul/qemu-%M
Source path       /home/lsd/qemu/qemu
C compiler        gcc
make              make
host CPU          i386
host big endian   no
target list       i386-softmmu
gprof enabled     no
static build      no
SDL support       yes
SDL static link   no
mingw32 support   no
Adlib support     no
FMOD support      no

KQEMU module configuration:
kernel sources    /lib/modules/2.6.10-1-k7/build
kbuild type       2.6
WARNING: cannot compile statically with SDL - qemu-fast won't have a graphical o
utput
lsd@cletus:~/qemu/qemu$ 
```

▲ **QEMU has quite a few options to play with.**

module, apart from the fact that it can, by its nature, only work on x86 systems, is that it's currently not open source. It is completely free of charge to use though, so as an end user it's really not that big a deal.

Installing QEMU

You can grab tarballs of QEMU from the QEMU website (bellard.org/qemu), but that's no fun – the good stuff is in the CVS repository. That good stuff currently includes the support code for using the KQEMU module, so if you want virtualisation-level performance, compiling from CVS is your only option. Follow these steps to get QEMU and KQEMU installed and running on your system

1 Make sure you have CVS, the development packages for the SDL library, the 'texi2html' documentation-building tool, and the headers for your kernel installed. For the first three, you want the 'cvs', 'ibsdl1.2-dev' and 'texi2html' packages on Debian/Ubuntu (other distributions should have similar packages). If you compile your own kernels, you should be fine for headers, but otherwise, install the kernel headers package from your distribution that matches the kernel you're running.

2 Open a terminal, enter the /usr/src directory, and make sure there's a 'linux' symlink pointing to the folder containing your kernel source or headers. If there isn't, add one in:

sudo ln -s linux-2.6.10 linux

3 Grab the QEMU source code from its repository on GNU's Savannah server:

export CVS_RSH="ssh"
cvs -z3 -d:ext:
anoncvs@savannah.gnu.org:/cvsroot/
qemu co qemu

Answer 'yes' when prompted (you'll only be asked this once, as with any other SSH host connection), and the qemu source code will be downloaded.

4 Grab the KQEMU module tarball (kqemu-0.6.2.tar.gz at time of writing) from the QEMU website.

5 Enter the qemu directory and extract the KQEMU tarball:

cd qemu
tar zxvf ~/kqemu-0.6.2.tar.gz

6 Run the QEMU 'configure' script:

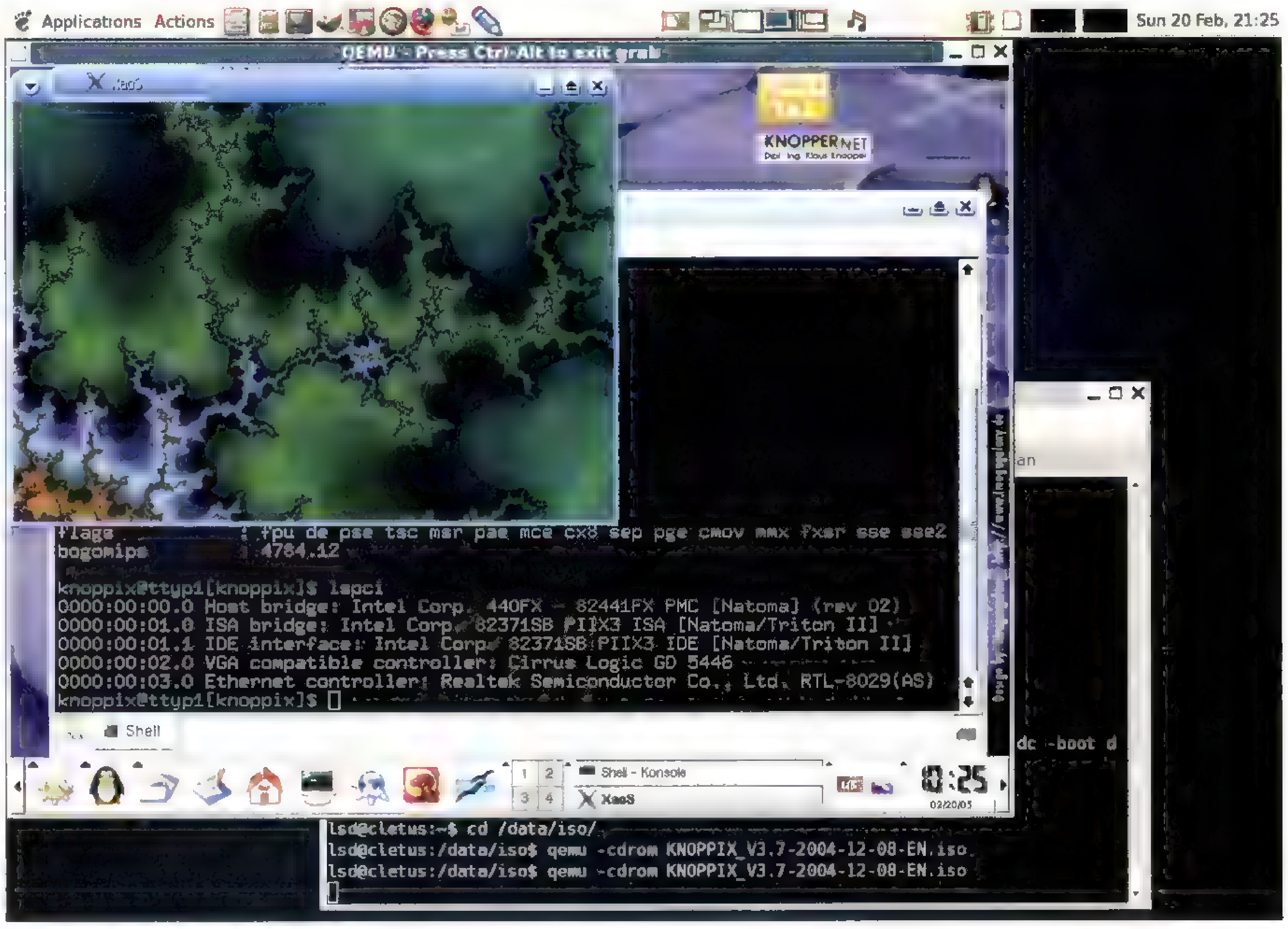
./configure --target-list=i386-softmmu

Make sure that QEMU has found your SDL library, and your kernel headers for KQEMU support. There are a few other options you can play with, including various other targets to build (QEMU features experimental PowerPC, AMD64, Sparc and ARM emulation as well) – check the output of **. configure --help** for more info.

7 Start the build, and install it all once it's done:

make
sudo make install

→



```
flags           : fpu de pse tsc msr pae mce cx8 sep pge cmov mmx fxsr sse sse2
bogomips        : 4784.12

knoppix@ttyp1[knoppix]$ lspci
0000:00:00.0 Host bridge: Intel Corp. 440FX - 82441FX PMC [Natoma] (rev 02)
0000:00:01.0 ISA bridge: Intel Corp. 82371SB PIIX3 ISA [Natoma/Triton II]
0000:00:01.1 IDE interface: Intel Corp. 82371SB PIIX3 IDE [Natoma/Triton II]
0000:00:02.0 VGA compatible controller: Cirrus Logic GD 5446
0000:00:03.0 Ethernet controller: Realtek Semiconductor Co., Ltd. RTL-8029(AS)
knoppix@ttyp1[knoppix]$ 
```

```
lsd@cletus:~$ cd /data/iso/
lsd@cletus:/data/iso$ qemu -cdrom KNOPPIX_V3.7-2004-12-08-EN.iso
lsd@cletus:/data/iso$ qemu -cdrom KNOPPIX_V3.7-2004-12-08-EN.iso
```

▲ **A KNOPPIX ISO is a great quick QEMU test.**

8 Load the kqemu module in to your kernel:

```
sudo modprobe kqemu
```

If everything has gone to plan, you should be ready to try firing up a virtual machine. QEMU dosen't have a nice GUI like VMware, instead using a simple command-line interface to specify options like the disks or image files to attach as drives to the virtual system. As a quick test, grab the ISO image of a live CD like Knoppix, and boot it inside QEMU:

```
qemu -cdrom KNOPPIX_V3.7.iso
```

If you don't have an appropriate ISO handy, stick a CD in and specify the path to your CD device (eg: '/dev/hda') instead. Either way, the QEMU window should appear, showing the usual KNOPPIX boot screen, and with a quick hit of the enter key it'll start booting inside your new virtual machine.

Any keystrokes in the QEMU window (or at least, any that don't get trapped by your desktop) will get sent through to the virtual PC. To take control of the virtual mouse, click in the window, and the virtual PC will capture your mouse – to release it, hit Ctrl and Alt at the same time. Once you're suitably impressed, shut the machine down, and we can get down to installing some operating systems.

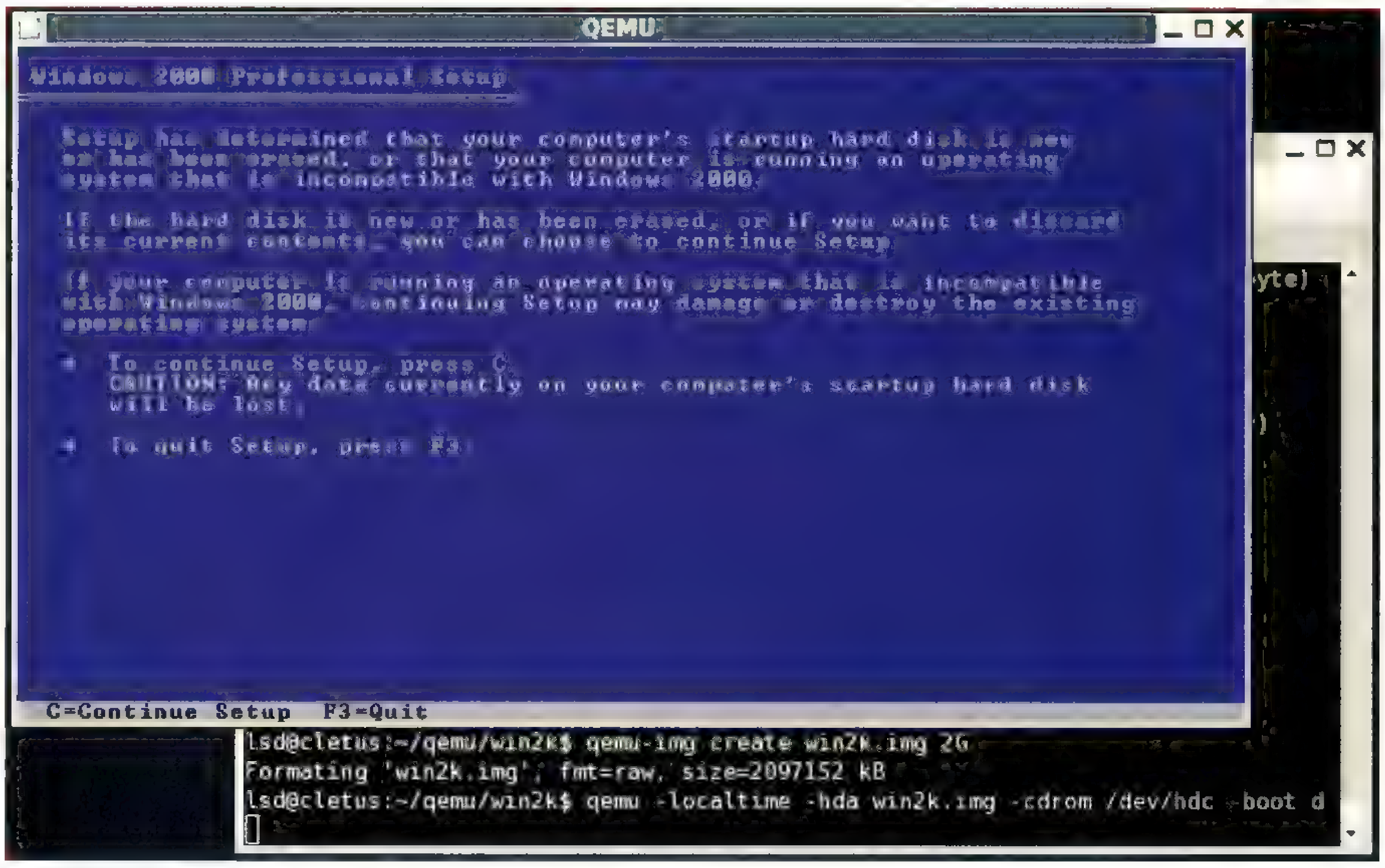
Creating a virtual OS install

The first step to installing an OS is to create a virtual hard drive. As with the ISO image above, virtual drives are handled using image files that sit on your real PC's filesystem. QEMU comes with a handy image creation and manipulation tool called 'qemu-img'. To create a nice 4GB image file for a Windows install, try:

```
qemu-img create win2k.img 4G
```

The image file doesn't take a constant 4GB of space – it starts off at 0 bytes in actual size, and expands as it's written to.

You could boot a virtual system with just your new virtual drive attached, but with nothing installed on it that's not going to get you very far. Insert a Windows CD and boot a QEMU system from the CD, but with your new drive attached. Windows 2000 is the best option performance-wise (though with a couple of small issues to bear in mind), but XP works well enough in a pinch.



```
Windows 2000 Professional Setup

Setup has determined that your computer's startup hard disk is new
or has been erased, or that your computer is running an operating
system that is incompatible with Windows 2000.

If the hard disk is new or has been erased, or if you want to discard
its current contents, you can choose to continue Setup.

If your computer is running an operating system that is incompatible
with Windows 2000, continuing Setup may damage or destroy the existing
operating system.

  •  To continue Setup, press C.
     CAUTION: Any data currently on your computer's startup hard disk
     will be lost.

  •  To quit Setup, press F3.

C=Continue Setup  F3=Quit
```

```
lsd@cletus:~/qemu/win2k$ qemu-img create win2k.img 2G
Formating 'win2k.img', fmt=raw, size=2097152 kB
lsd@cletus:~/qemu/win2k$ qemu -localtime -hda win2k.img -cdrom /dev/hdc -boot d
```

▲ **Starting the Windows 2000 installer.**

```
qemu -localtime -hda win2k.img -cdrom
/dev/hdc -boot d
```

The '-localtime' option is handy, but not strictly necessary – it sets the system clock in the virtual PC to your current system time, which is what Windows expects it to be. QEMU sets the time to UTC by default, so when you're installing a Linux distro you can keep that default and tell the virtual system that it's running its system clock in UTC.

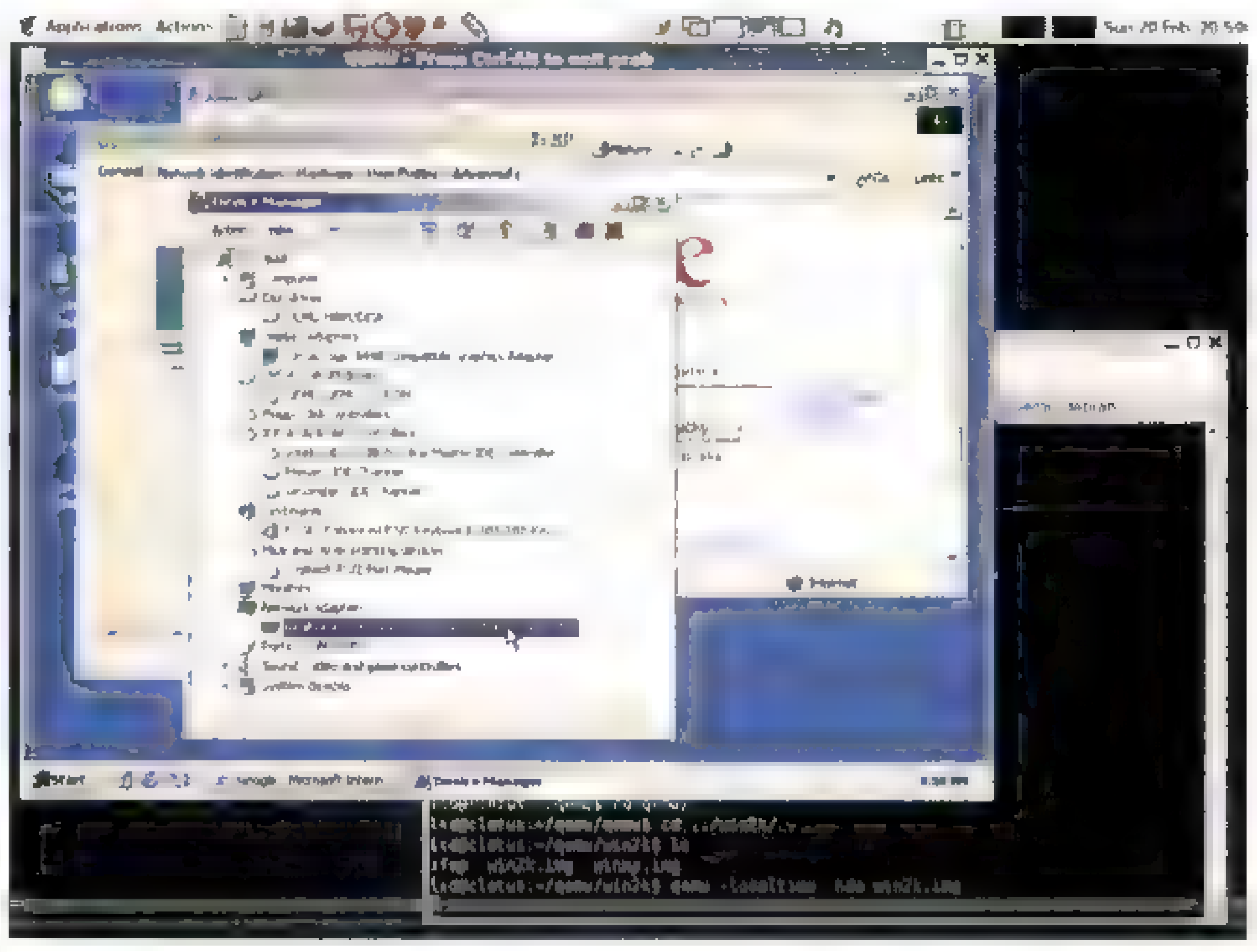
From here on in, the process of installing Windows is really no different to installing it on a real PC. If you're installing Win2k, which I'd recommend, you might fall victim to an annoying bug that causes the installer to fill your hard drive with junk log files before completing the installation. If this happens to you, re-run the installation, but during the start of the second phase, when Win2k starts scanning your system for hardware (with the progress meter), check the actual size of your image file every few seconds:

```
du -sh win2k.img
```

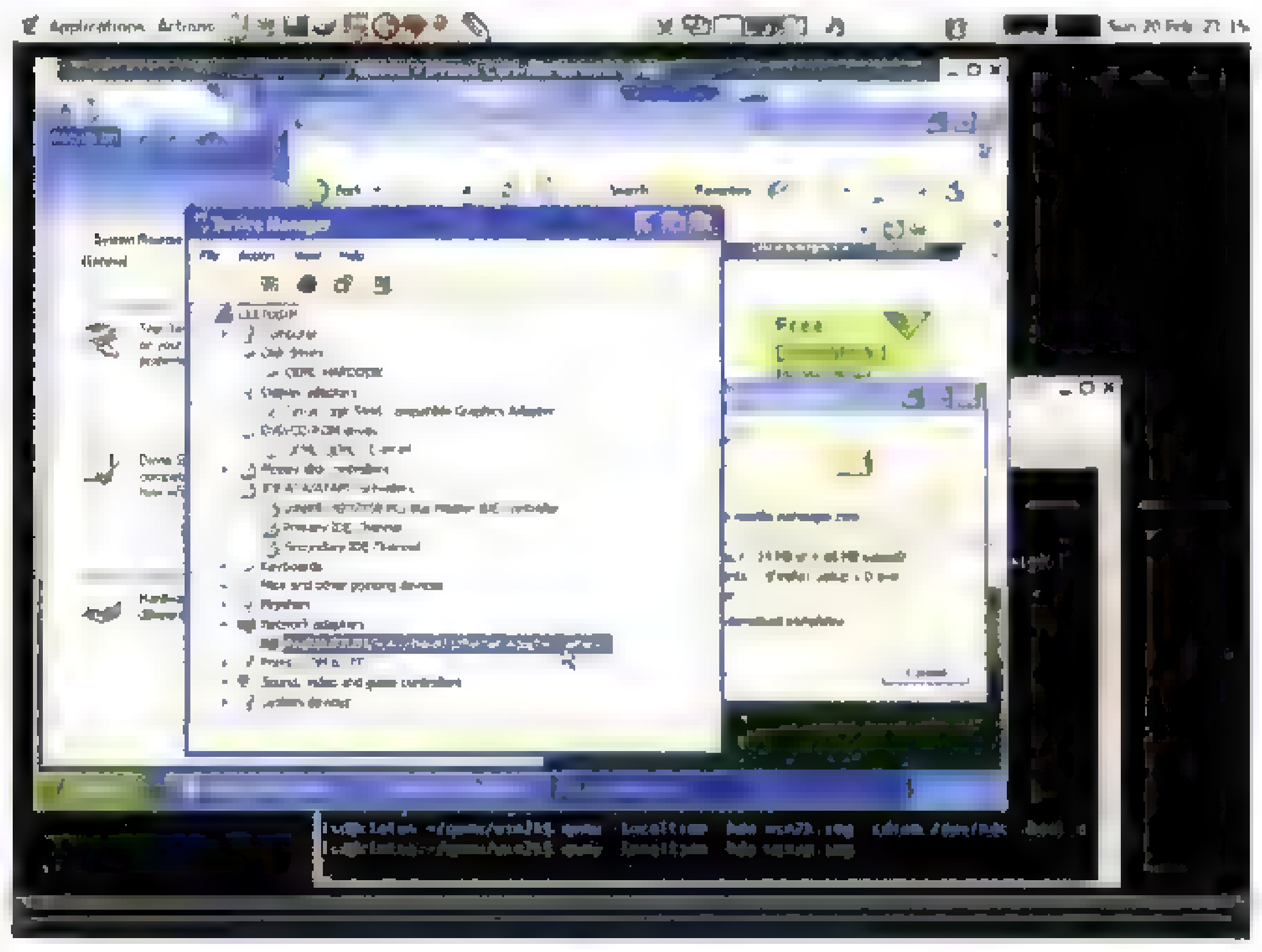
When you see it start to ramp up in size quite quickly, kill QEMU and restart it without the '-boot d' option – this will boot the system from the hard drive straight in to the second phase of the installer. The hardware detection screen will appear again, but the progress meter should quickly skip over the first 20 percent or so, and you should be able to run the install through to the end. If you still experience problems, try restarting the installer a few times, or changing from FAT to NTFS.

Once the Windows install is complete and you've booted in to the system, just about everything should be good to go. One of the great things about QEMU is that since its emulated hardware is fairly unexciting, it's quite well supported, so both 2000 and XP should have no problem configuring your virtual video and network cards.

The networking setup in QEMU is almost too cool for words. It sets up a virtual LAN,



▲ **Windows is installed and ready to do your bidding.**



▲ **XP runs as well, but the performance takes a hit from the shiny UI.**

with a DHCP server ready to hand your virtual machine an IP address. It also acts as a router and DNS proxy, using an age-old UNIX hack called 'slirp' to seamlessly stream the packets from your virtual system through your real one. All this means that, especially with Windows virtual systems, networking and internet access through your real system should Just Work, so you should be able to fire up IE and browse your favourite pages insecurely straight away.

The QEMU monitor

With no real GUI to interact with beyond the virtual display, QEMU uses a command line for performing tasks like swapping CDs or forcibly rebooting the system. By default, the QEMU monitor resides on a virtual terminal inside the QEMU window, which you can access by hitting Ctrl-Alt-2.

To swap the CD in the drive, eject it and then insert the new drive or image file:

```
eject cdrom
change cdrom cd.iso
```

The 'sendkey' command can also be quite helpful when you need to send a key combo that would otherwise get intercepted by your Linux desktop environment:

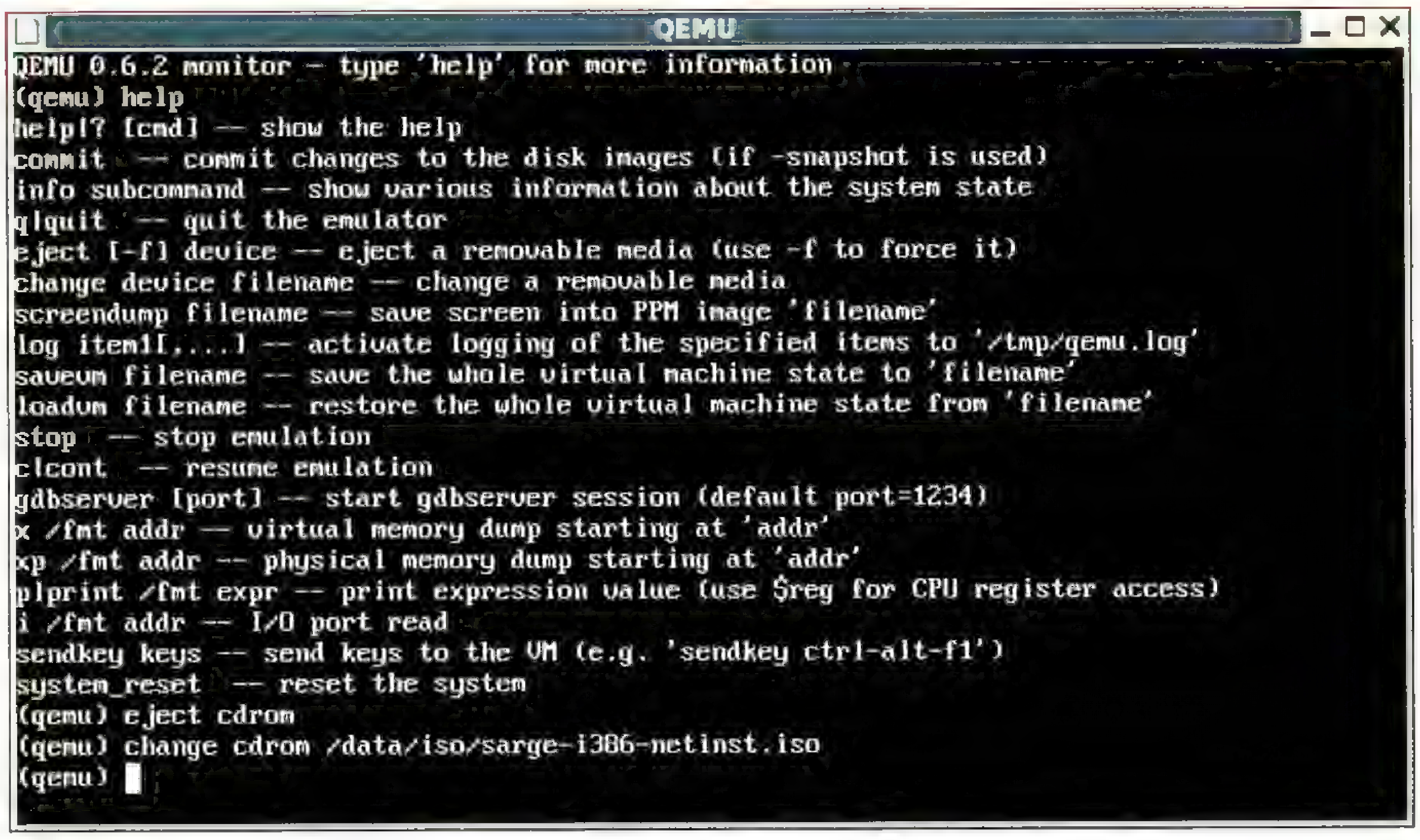
```
sendkey ctrl-alt-delete
```

Other commands work playing with include 'loadvm' and 'savevm', which you can use to suspend a virtual machine to disk, to be quickly reloaded later. This still needs some work though – sometimes it works well, but other times it can fail spectacularly.

Disk tricks

One neat thing about the system-in-a-file concept is that a complete system snapshot is just a 'cp' away, so you can easily save a known-good image file before playing around with some new piece of software. QEMU has a better way of handling this though – when run with the '-snapshot' option, QEMU runs your disk images in a read-only mode, with any changes written instead to a temporary file that's thrown away at exit. If you happen to make changes that you'd like to keep, you can write the changes back to the disk image with the 'commit' command in the QEMU monitor.

You can also create copy-on-write images, which operate like a permanent version of snapshot mode



```
QEMU 0.6.2 monitor - type 'help' for more information
(qemu) help
help|? [cmd] -- show the help
commit  -- commit changes to the disk images (if -snapshot is used)
info subcommand -- show various information about the system state
q|quit  -- quit the emulator
eject [-f] device -- eject a removable media (use -f to force it)
change device filename -- change a removable media
screendump filename -- save screen into PPM image 'filename'
log item1[,...] -- activate logging of the specified items to '/tmp/qemu.log'
savevm filename -- save the whole virtual machine state to 'filename'
loadvm filename -- restore the whole virtual machine state from 'filename'
stop  -- stop emulation
c|cont  -- resume emulation
gdbserver [port] -- start gdbserver session (default port=1234)
x /fmt addr -- virtual memory dump starting at 'addr'
xp /fmt addr -- physical memory dump starting at 'addr'
p|print /fmt expr -- print expression value (use $reg for CPU register access)
i /fmt addr -- I/O port read
sendkey keys -- send keys to the VM (e.g. 'sendkey ctrl-alt-f1')
system_reset  -- reset the system
(qemu) eject cdrom
(qemu) change cdrom /data/iso/sarge-i386-netinst.iso
(qemu) █
```

▲ The QEMU monitor lets you perform tasks like swapping CDs.

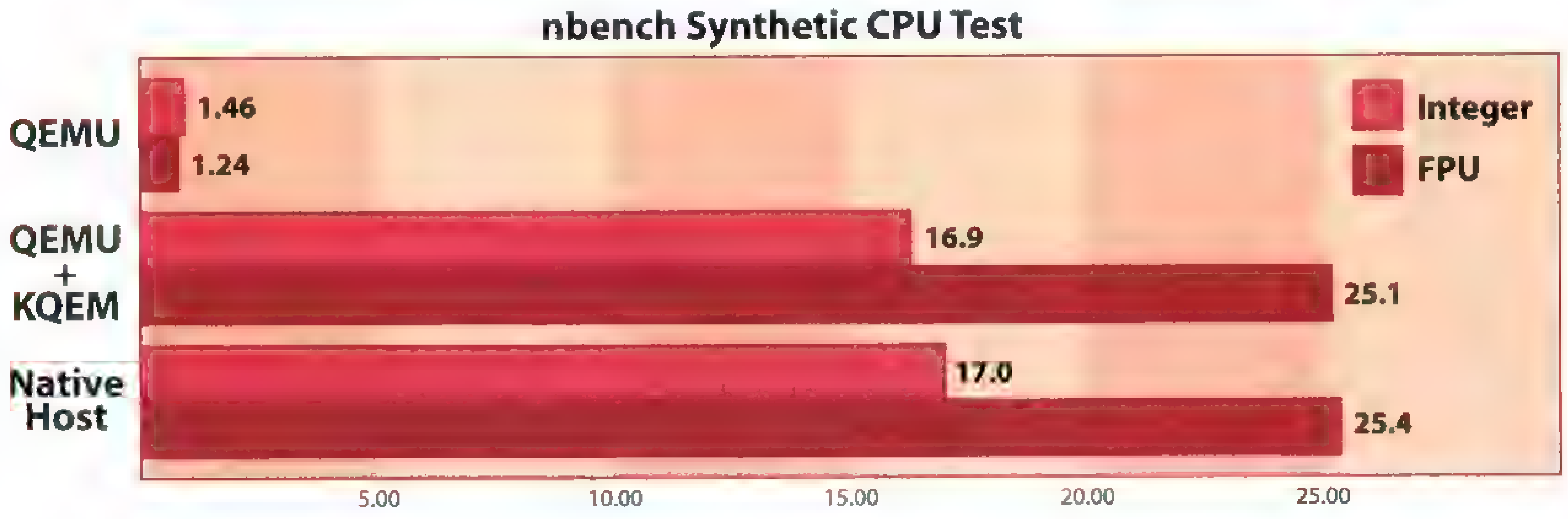
The new image is based on an existing image file, but contains only the changed blocks of the disk. This means that you can get your system to a nice state, and then make a copy-on-write image to work on, safe in the knowledge that you can revert to that known state at any point. You could also create a standardised base image, and create any number of extra virutal systems from it.

To create a copy-on-write image, use the 'qemu-img' command:

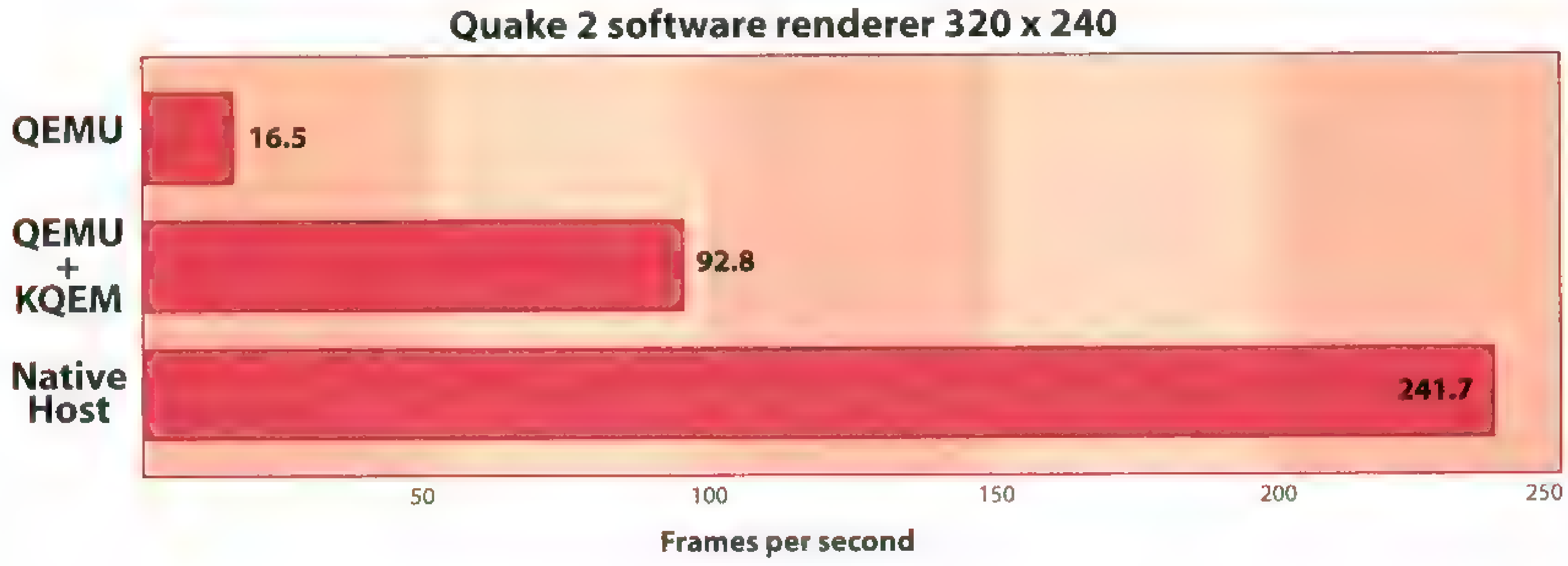
```
qemu-img create -b debian.img -f qcow
debian.qcow
```

qemuperformance

QEMU's kernel accelerator module really kicks its performance up to another level, with ideal CPU performance very close to the host system.



The interactive performance of the virtual system is still quite a bit lower than the host system though, due to the emulated PC components, particularly the video card. It's hard to put numbers on interactive performance since it's so subjective, but we did find a good benchmark that stressed both the CPU and the video.



Superior shine

Ron Prouse whips out the duster to give your PC a brand new lease on life.

Computers are a choice gathering place for dust, pet-hair and cobwebs. Many times you've probably removed a side-cover, to be greeted by an Aladdin's Cave of elements that obviously like to gather in small, warm, and dark environments… like peering into some form of alien biosphere, where silicon and electricity are the alpha beings. Or just pet-hair and dust mite poo.

Regardless, there comes a time when you have to do something about it, not just for the sake of peer-group pressure, but also to maintain the peak performance that the PC is capable of – clogged fans and heatsinks dissipate less heat and can result in overheating, for example. Bugs and dust can do *nasty* things to our beloved gear, and can you live without your machine if it breaks down for even *one* day?

So, the two big questions are: where to start and what to use?

[illegible]

Tools of the trade

Although most of the tools used for PC cleaning are found around the average home, it is a good idea to acquire task-specific implements and keep them solely for this purpose. As an example, using a sibling's / partner's toothbrush to scrub off fan-scum will not endear you to that person. Ever.

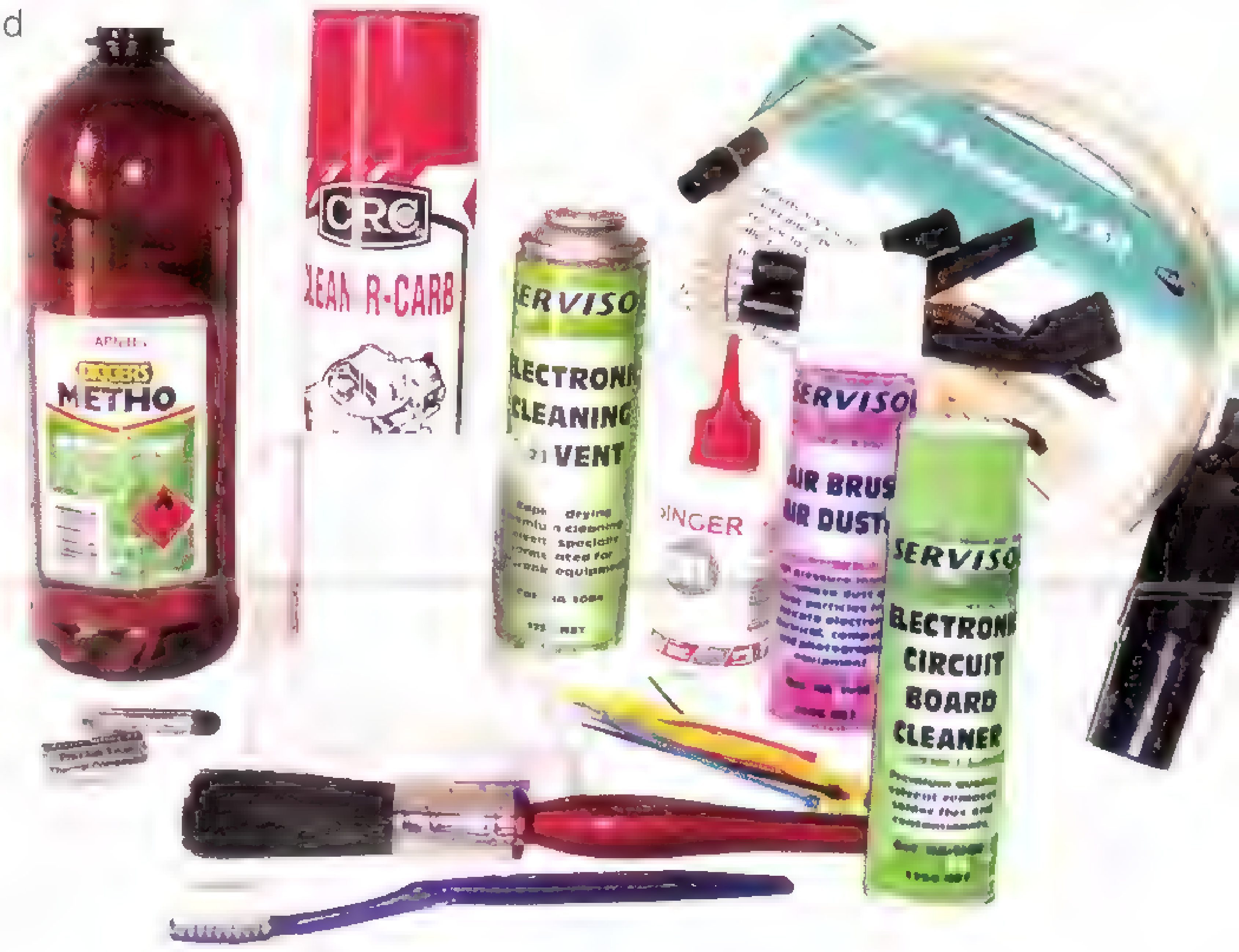
The most useful implement is a 25mm paintbrush – small enough to get into most spaces, a bristle brush will remove dust from PCB's without catching and is great for cleaning fans.

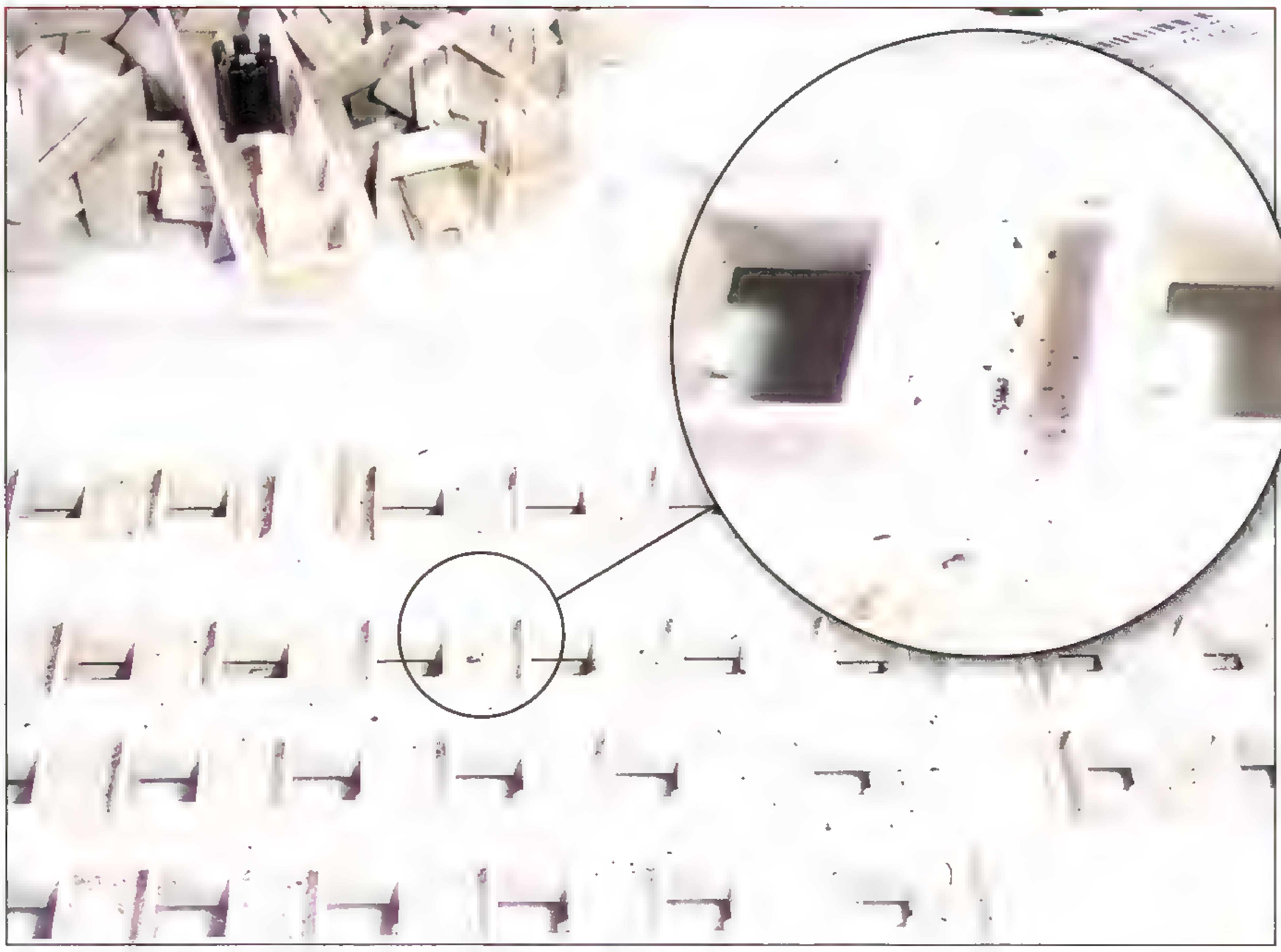
A toothbrush will fit into spaces that the paintbrush won't, but it will be a little rougher on the surface – which is an advantage if you are removing stubborn gunk. For example, if you had a coolant spill that left glycol residue all over a chip. A quick scrub with a toothbrush, soaked in methylated spirits, will remove the residue.

Cotton buds are great for removing dust on fans and removing old thermal paste, especially when used in conjunction with a hydrocarbon cleaning solvent – a specific aerosol Electrical Cleaning Solvent such as Jaycar NA1004 $9.25 is fantastic. An alternative for this type of use are isopropyl alcohol wipes, available from any chemist.

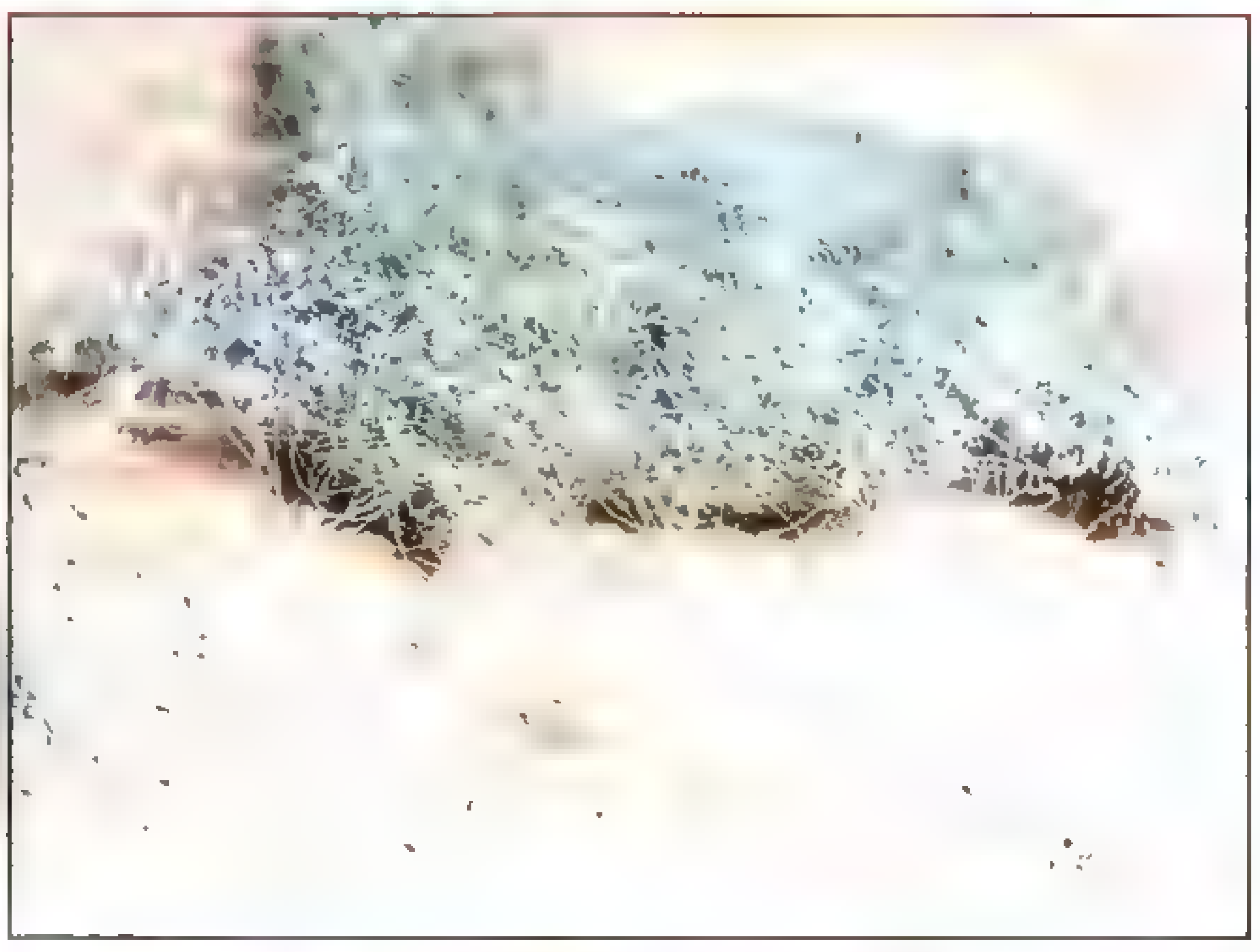
The machine oil is for lubricating fans, the thermal paste is for refreshing heatsinks and the cable-ties are for replacing the ones that have been removed for disassembly!

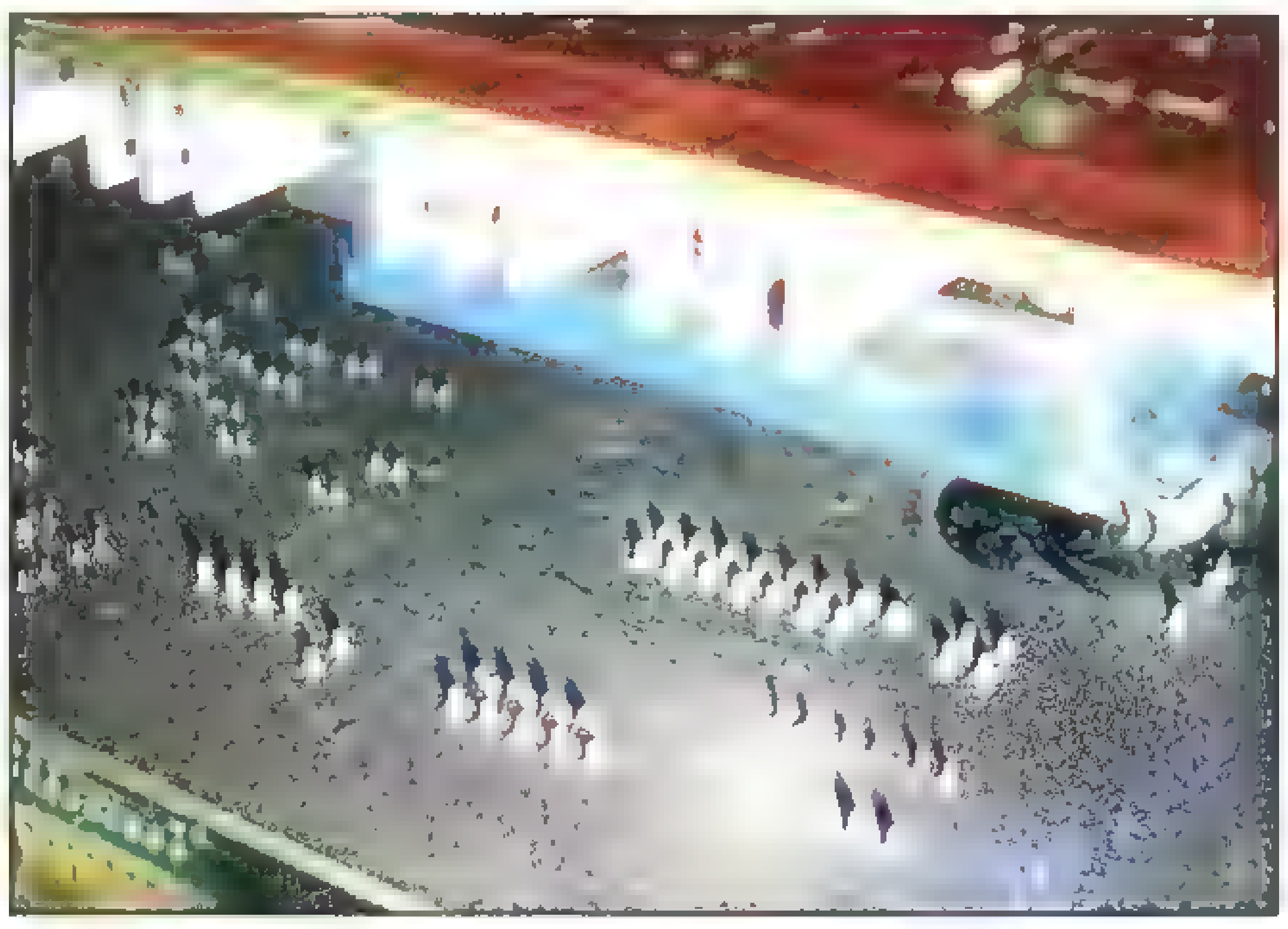
▼ **Not your usual cleaning gear – this is *hardcore* cleaning kit.**





▲ **Eww! Bits of you! Don't let your mother see this.**





▲**Clean both around and *between* cards.**

Keyboard and mouse

The obvious place to start a major clean-up is the keyboard and mouse. As the more 'open', hands-on interface between man and machine, the keyboard has been voted as 'Component most likely to be full of dead human skin cells, oils and potato chips'. And often, questionable stains.

Cleaning the keyboard can be as simple or complicated as you like – this keyboard has been completely disassembled and will be scrubbed and soaked in warm water and Napisan. The next step is to dry and re-assemble, making sure that you know which key goes where.

Cleaning a mouse is simply a matter of removing the mouse ball by unscrewing the retention ring and shaking it out. Inside the mouse you will see two small rollers that the ball rotates for two dimensional cursor movement, usually covered in fluff and gunk. These rollers should be cleaned with either isopropyl alcohol wipes, or cotton buds soaked in methylated spirits. Cleaning the mouse-ball itself is best done with warm, soapy water, while the rest of the mouse body and cable can be cleaned with a soft cloth, dampened in the same solution. In the case of an optical or trackball mouse, the LED pickup lenses should be cleaned using cotton buds soaked in methylated spirits or aerosol hydrocarbon cleaning solvent and a soft cloth. If you want to add a little extra 'slide' to the mouse, try adding a Teflon tape across the base contact points.

Dust bunnies

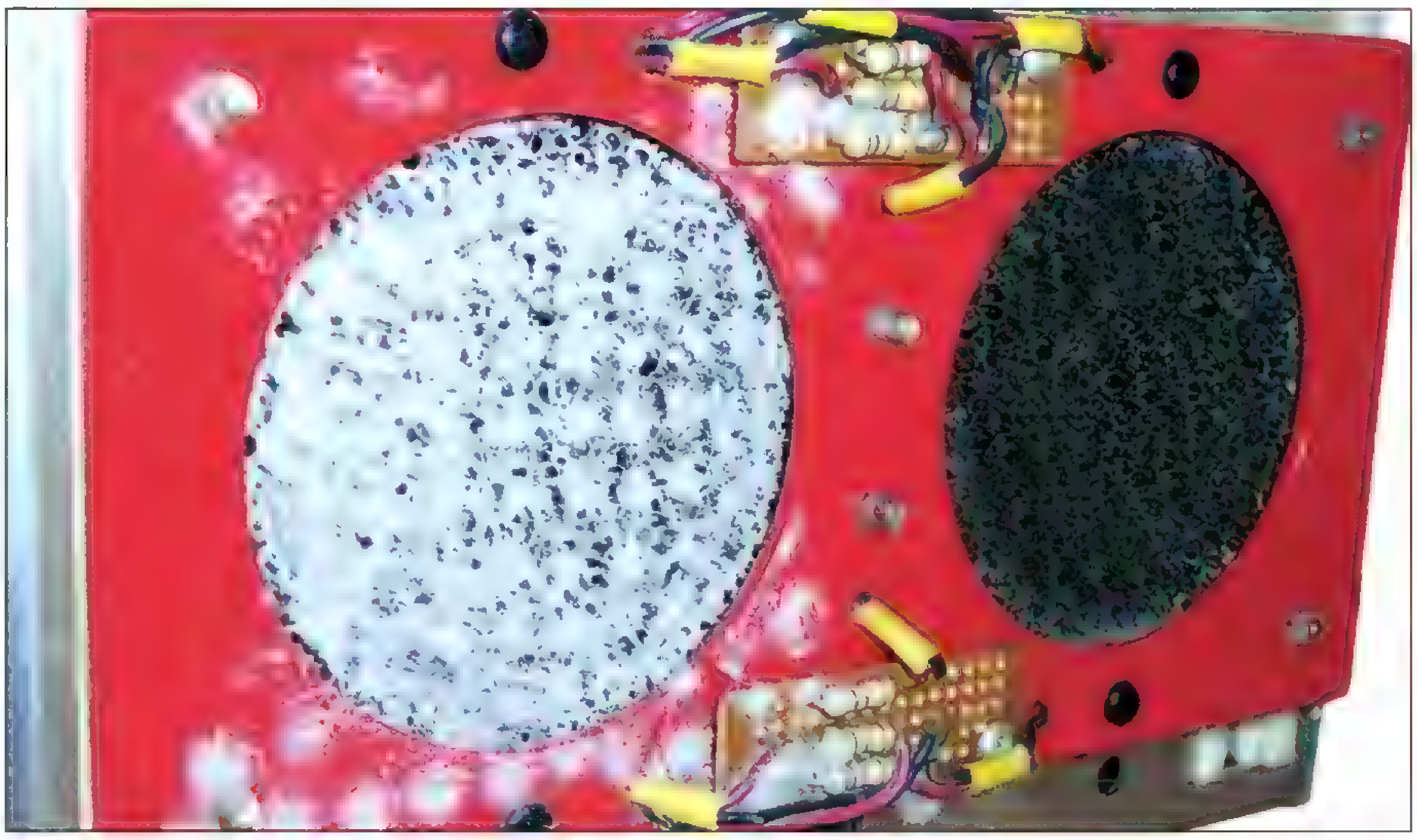
The fact is that the average computer owner does not open their computer case, from the day it is purchased to the day it is replaced.

As enthusiasts we are somewhat different, regularly delving around inside as we upgrade, to improve and increase both performance and aesthetics. However, most of us are slack and only clean out our computers properly once a year or so (if at all!) The thing is, even just a thin layer of dust over everything can look pretty disgusting when it is collected into one large dust bunny.

Moving into the inside of the case, use the paintbrush to sweep out any dust, hair and fluff from the mobo, PCI cards and from around the optical drives. A final wipe over the inner case panels with methylated spirits on a soft cloth should remove the last of the grime. One warning, *do not* use a vacuum cleaner, as the likelihood of killing static-sensitive components is very real.

Filters

Although an air intake filter is not the most glamorous item to add to a case, it certainly is one of the more functional. This filter is a standard fitment in a Lian Li PC-60, using low density foam as the element, however there are myriad styles that either use aluminium →



▲ **The advantage of filters – catch it here or you'll find it in your CPU heatsink fan.**

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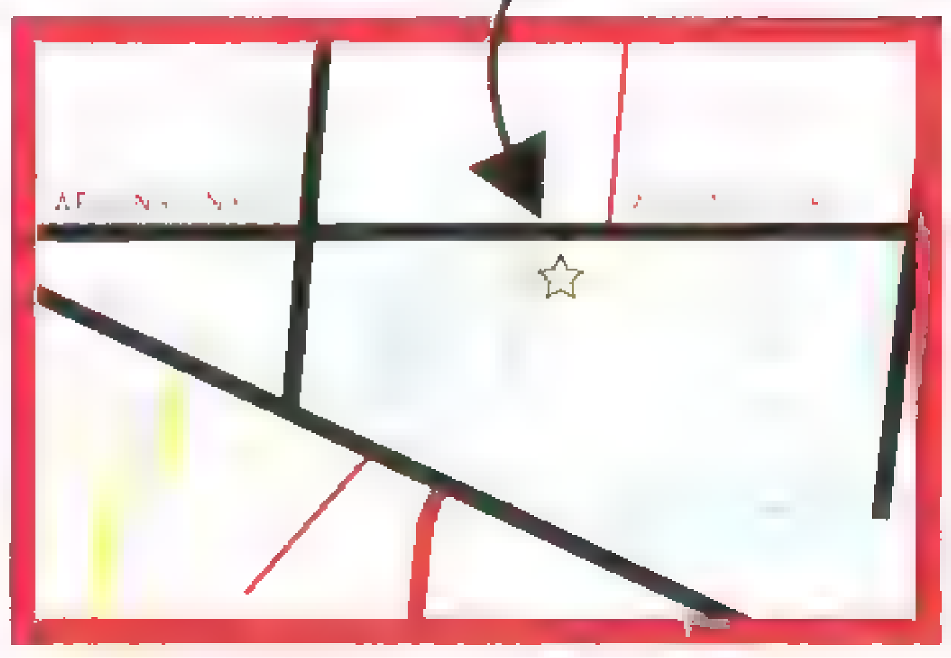

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gauze or paper elements to achieve a similar effect. Just how effective air filters will work depends on the environment the PC is working in… the left hand side of the filter shows about 4 months accumulation of dust in a computer which runs 24/7 in a clean, home-office location. If your PC lives at floor level, especially on carpet, then it will ingest far more foreign matter than the same box positioned off of the floor.

Heatsink fans (HSF)

Spring cleaning a PC is mainly about regaining performance lost. The main area where dust and fluff can impact on a PC is the CPU and GPU heatsink fans (HSF), where an accumulation of crap will reduce the cooling efficiency quite dramatically. Which in turn then impacts on overclockability and system stability.

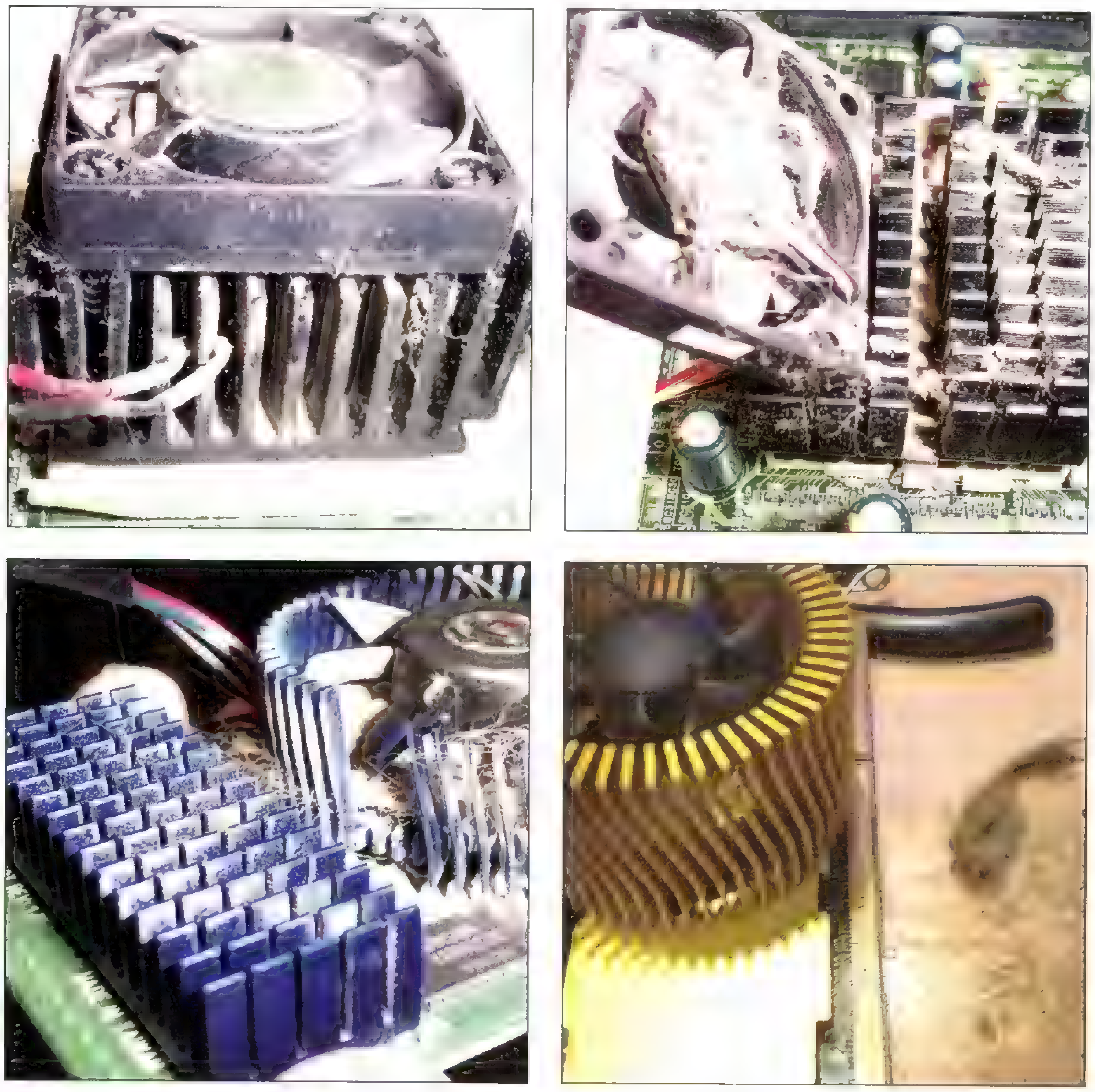
To gain back the lost cooling ability of an HSF the cleaning process has to be comprehensive. The fan should be removed, cleaned and lubricated – or swapped out for a new fan if preferable. The heatsink itself should have any residual thermal paste removed with isopropyl alcohol, and then be scrubbed with a suitable brush in hot soapy water. The CPU / GPU die should also be meticulously cleaned with isopropyl alcohol, ready for a new layer of thermal paste. Inspect any RAM heatsinks on video card memory for contamination or 'looseness', and rectify as necessary.

Cleaning and oiling fans

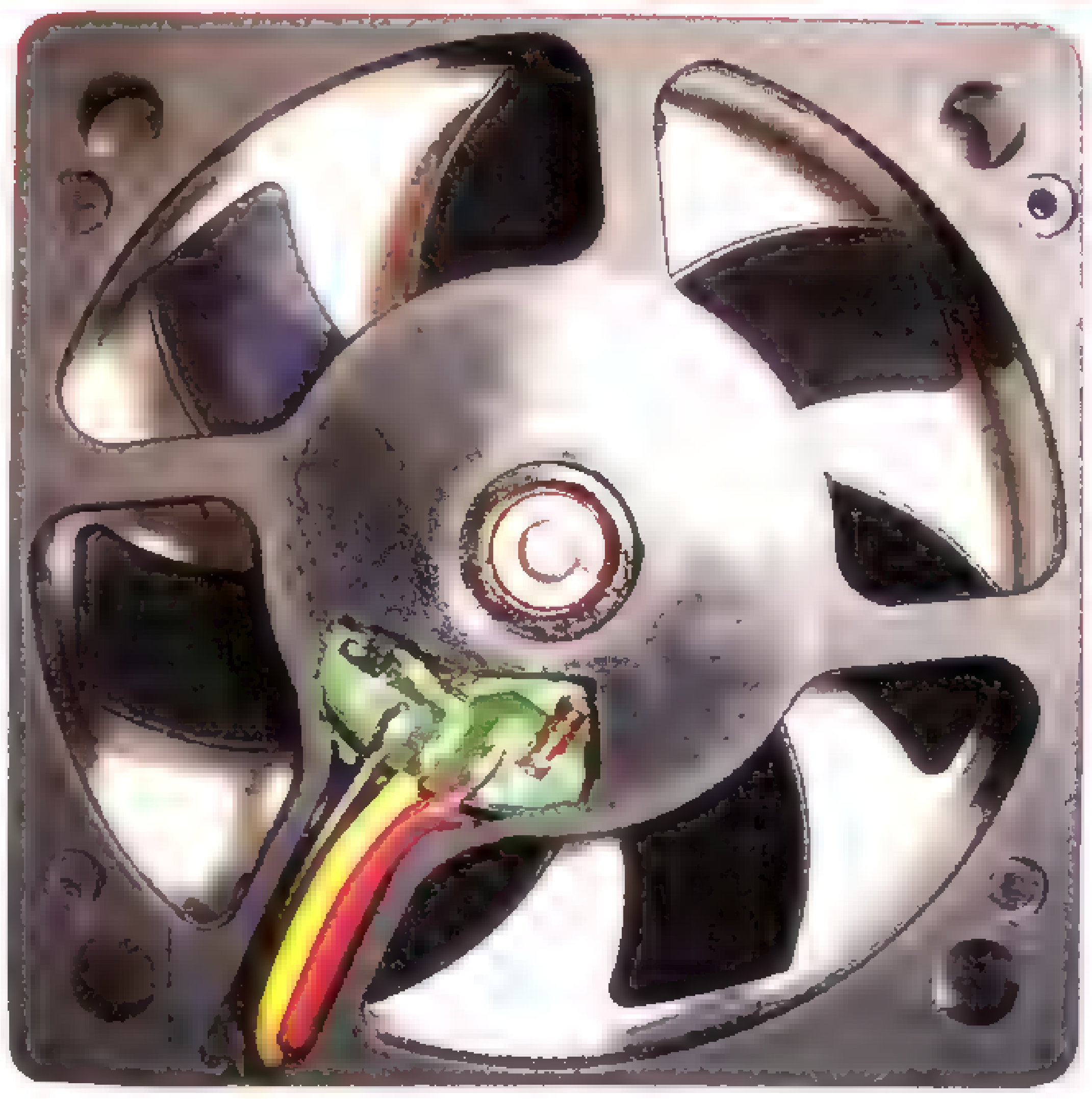
One of the first places that dust will appear in a computer is on the blades of fans. As air is sliced by the plastic blades it creates a small amount of static electricity, making the surface 'sticky' to any dust particles in the air.

Cleaning any fan is a straightforward process, with the first step being to wipe off surface dust, and then gently scrub away any 'persistent' residual off of the blades and frame with a toothbrush moistened in soapy water. At no time should the fan be immersed in the water. A soft cloth or tissue should be used to dry the fan thoroughly.

Re-oiling a fan will not always be necessary as part of cleaning, but it is a good preventative step to keep in mind – by the time a fan starts to get noisy (a rumbling sound) it has usually damaged the bearing / bush anyway.



▲ **Years of abuse can lead to horrible images like this. Have a heart, clean your PC!**



▲ **A clean fan is a happy fan.**

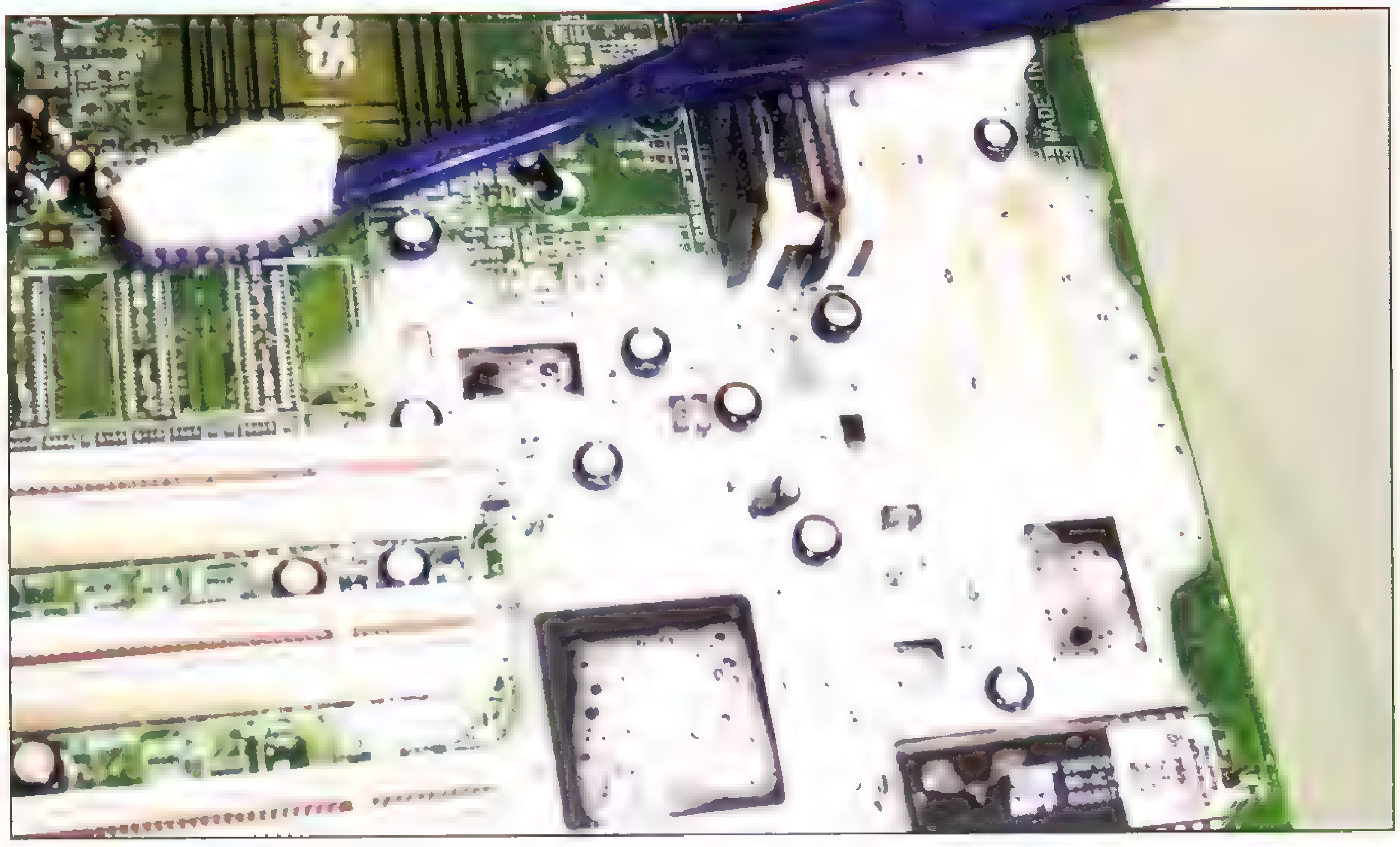
Lubricating the bearing can be done in two ways, the simple and the hardcore. Both methods require the removal of the sticker from the centre boss – this will normally be the brand and specs decal – to expose the end of the shaft that the blades rotate on. On the end of the shaft there is usually a small circlip, which holds the shaft in place. The simple technique is to run 2-3 drops of machine oil over the circlip end of the shaft, working on the principal that it will suck in somewhere! The more thorough method involves removing the circlip and sliding the complete blade / magnet assembly off of the frame. This gives easy access to the bearing and, once a drop or two of oil has been applied, assembly is as simple as sliding the shaft back into the bearing and clipping the circlip into place. The finishing touch is to place the sticker onto the centre boss, helping to stop the oil from trapping dust or spreading over the fan frame.

A small tip 'Instant Windscreens' have a give-away 'emergency repair sticker' that will stop a chip in a car windscreen from getting any larger or cracking. It is about the size of a 10c piece, clear and extremely adhesive… just perfect as a replacement of the fan decal if the OEM item is destroyed.

→

▼ **For best results pull the fan assembly apart before cleaning.**

▲ **Use paper to achieve a perfect finish.**



▲ **Use a toothbrush to clean your motherboard. For humour value, use your sister's.**

Applying thermal paste

One of the most common tasks that an accomplished geek will perform is applying fresh thermal paste to either the CPU or GPU. It is also one of the things that is done badly most often.

Although there have been many debates regarding the value of using brand name thermal compounds on the market, it is our experience that generic brands tend to dry out and break-down over time, and really the discussion is over a lousy few dollars. It's best to use an established brand like the Arctic series, as most are electrically non-conductive – and therefore 'safer'.

A tip for those who want the perfect finish on their paste install is to use masking (or sticky) tape around the edges of the die and remove it after application.

Mobo / PCI card cleaning

Although the normal cleaning of a PCB will require nothing more than a dust-off with a dry bristle brush, sometimes old age or accidents will require more serious cleaning techniques. Although motherboards and expansion cards are not really dishwasher safe, they can be washed in warm soapy water if maximum care is taken. First thing is to remove everything that can be removed (RAM, etc.) and that *especially* includes the CMOS battery. Use a mild cleaner and a very soft toothbrush, and gently work over small areas at a time. Once clean, rinse off with plenty of clean water and allow to completely air dry – meaning 2-3 days in some environments. Once dry, use a purpose-made PCB cleaning solvent to remove any residual impurities, making sure to concentrate on the ZIFF and expansion card sockets, and checking under ICs and capacitors. Look for any small gaps where water might be trapped by capillary action. Remember, water will not hurt any electrical componentry until there is power present, so make sure that *everything* is dry before hitting the 'On' switch!

Case and windows

With everything inside the case clean and tidy, it is time to complete the job with a little spit and polish on the outside.

Painted steel cases are fairly straightforward, with automotive cut'n'polish paste and silicon wax being the way to go. Work small areas at a time in a circular motion – Karate Kid 'wax on, wax off'-style.

Aluminium cases can be a little more complex, depending on the actual finish the manufacturer has used – some cases have an anodised finish that is best cleaned with a solvent, whereas some cheaper cases are clear-coated with acrylic paint, which some solvents will attack. If you are unsure, check on a small, inconspicuous spot before using harsh solvents such as acetone or thinners. Either way, it is a good idea to give the case a final protective coat of silicon wax such as used on cars, or even 'Mr Sheen' furniture polish will work. Just be careful picking-up the slippery little sucker afterwards!

Glass windows should be cleaned with an ammonia-based cleaner, however the same product can often etch and yellow-off cast acrylic. Perspex windows (in fact, all plastics) can be tidied up nicely using a fine metal cleaner called 'Brasso', which will even remove small scratches when used with a soft cloth and a circular motion. Windows should not be waxed – it will end up smearing.

After all is said and done your precious box should not only look as good as new, but may even perform like it too!

▼ **The result – a truly spankworthy case!**

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(Atomic Magazine, Issue 51)

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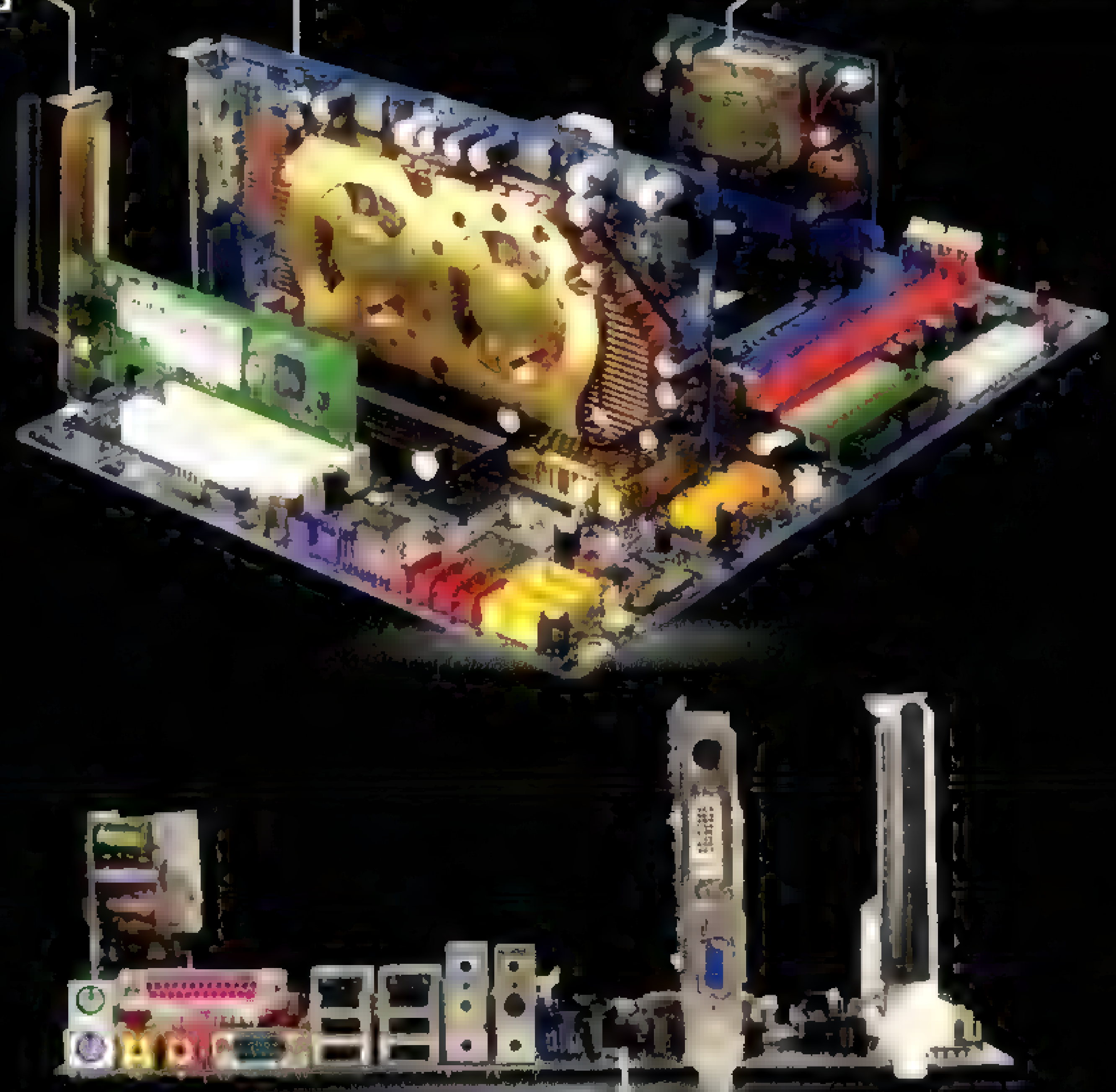

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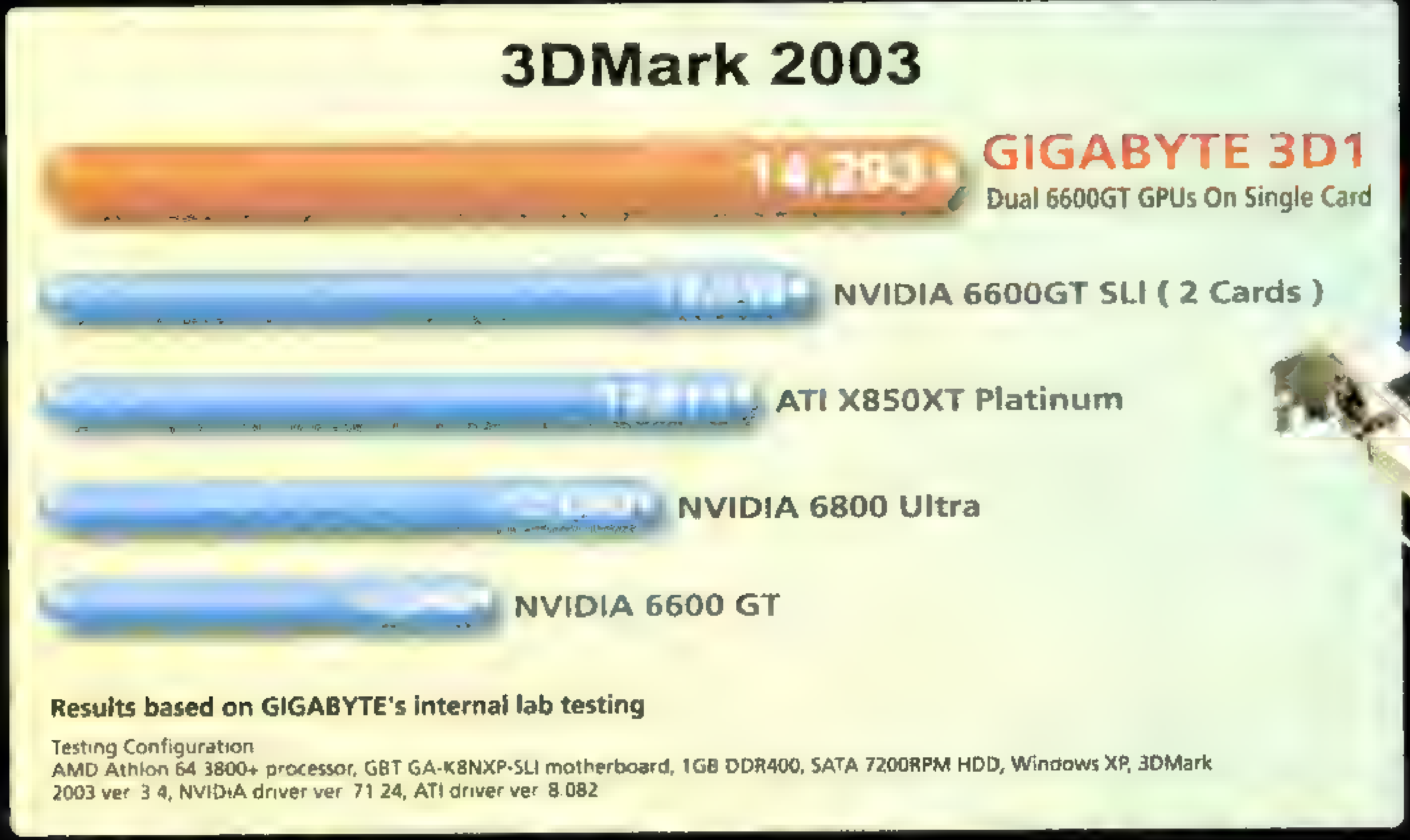

Results based on GIGABYTE's internal lab testing

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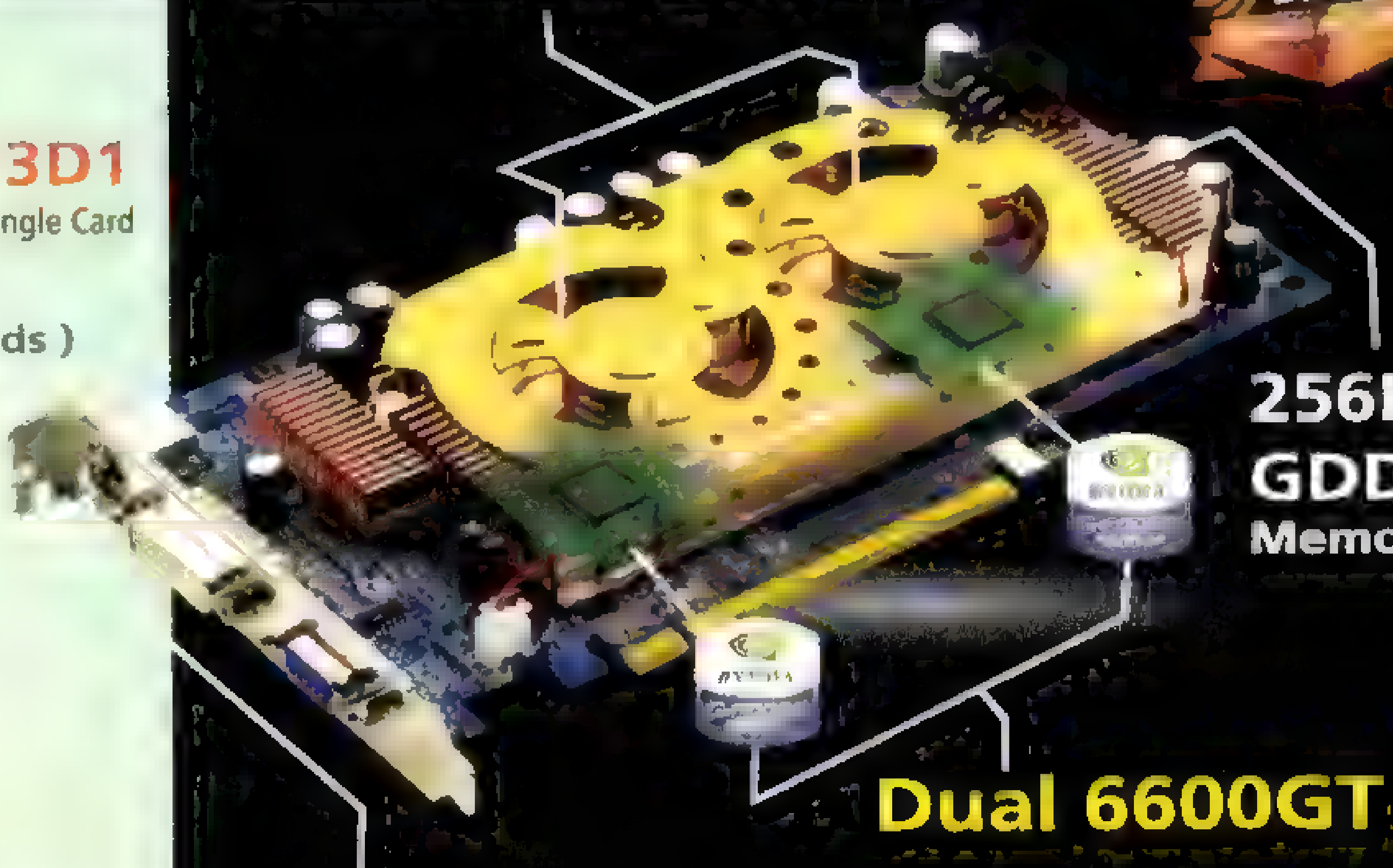

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BAFTA baffles

Logan Booker is convinced BAFTA hasn't a damn clue.

If you weren't already aware, the British Academy of Film, Television and the Arts recently announced the winners of its annual awards. The awards cover a wide range of entertainment mediums, including games, which is fantastic. Anything that promotes games in the mainstream can only be a good thing.

However, to say the winners of the Interactive category were a joke would be an understatement.

It would be the understatement to end all understatements, so much so that no statement could get underneath the statement without the help of a hoard of very angry moles with a bone to pick with the centre of the Earth.

Seriously, Otto Lidenbrock would have nothing on these little guys.

Valve's epic Half-Life 2 scooped six awards including Best Game. While you can, even if in a somewhat tentative manner, agree with it winning Best Animation and Best Art Direction, I had to physically refresh the winner's page three times before it registered that Half-Life 2 had won *Best Online and Multiplayer* as well. Here, visit the page: **www.bafta.org/interactive/announce.htm**. See for yourself just how clueless these guys are. But they shouldn't be, and I'll explain why in a moment.

For now, let us remember that Half-Life 2 *shipped with no multiplayer* – and Counter-Strike is not Half-Life 2. The multiplayer it has now, well, it's a token gesture at best. I'm sure Valve's programmers spent *years* perfecting it.

Note there are no MMOs on the list – World of Warcraft and EverQuest 2 being particularly absent. In their place are titles including Halo 2 – which I suppose is fair enough – but Ratchet and Clank 3? Insanity. Ratchet and Clank 3 is a fine game, but seeing as it's shackled to the backwards multiplayer capabilities of the PS2, it's hardly a contender for best online game.

Mind you, it had MP when *it* shipped.

Now, I have no idea how the BAFTA gets its nominees, seeing as it failed to respond to my request for a little question time. I'm guessing it gets a secretary type to whack 'top games' into Google and write down the results. Maybe it consults the stars, or gets tea leaf readings.

I honestly don't know.

Regardless, the board should know better – the fact Bullfrog god Peter Molyneux is there should count for something. And it probably does – I'm just not sure what it is now.

Simply put, BAFTA's Interactive category is an insult to gamers everywhere.

These people, and companies, deserve to be recognised for their work. In the case of games, the last few years have been an extravaganza of revolutions, in graphics and design, and the way society perceives games has started to shift – even though it still gets blamed by mainstream media for anything even remotely violent that happens these days.

The BAFTA's are a complete joke, and for it to make a mockery of these achievements is totally unacceptable.

Join Logan's holy crusade against the pineapple!
logan@atomicmpc.com.au

gameplaycontents

Scanner 80
Games are good. So good, they have their own news section! This month we talk to Leon Boyarsky over Troika's demise, update you on the world of MMOs and ponder the departure of Westwood veteran Mark Skaggs from EA LA.

Pipeline 82
What's on the horizon as far as gaming is concerned? Well, check out Pipeline for all your game previews!

Engine Room: Battlefield 2 86
Battlefield 2 baby, it's all Battlefield 2. James Wang chats to the developers behind this gorgeous multiplayer romp.

Gran Turismo 4 91
The ultimate performance racing simulator is back! Ron Osborn straps in for some intense, high-speed driving action. Well, that's what the box says anyway.

Splinter Cell: Chaos Theory 93
Feeling sneaky? Then you should join Sam Fisher and his sidekick Chris Booker for a bit of choice, er, espionaging.

Otogi 2 95
Grab yourself one of those funny *Dragon Ball Z* haircuts and join Alex Kidman for a bit of Japanese tentacle action.

SWAT 4 97
Sonny Bonds would be proud. Logan Booker checks out Irrational's tactical law enforcement FPS.

Playboy: The Mansion 98
Logan Booker dons his bed robe and gets jiggy with a couple of Playboy Playmates.

powergamer

By the time you read this, Doom 3: Resurrection of Evil will be on shelves. So, we thought it would be a great idea to scrounge up a few performance tweaks for id's graphically insane FPS. Just add these commands to the 'autoexec.cfg' file in the Base directory of your Doom 3 folder. You'll need to create it if it doesn't exist.

```
seta r_skipbump "0"
```

Disables bump-mapping. Only use if hamsters are doing your hardware transform and lighting.

```
seta r_skippostprocess "0"
```

Disables some of the fancy effects you'll see on glass and water – well, if there was any water on Mars.

```
seta com_fixedtic "-1"
```

Remember Doom 3's 60fps cap? Use this to remove it. Can have undesirable effects, so use with caution.

shortcircuits

Warcraft III

Although World of Warcraft takes up most of its time these days, it's good to see Blizzard still cares for its other titles – in this case, Warcraft III. The popular RTS was granted a new patch recently, bringing the game to version 1.18. While it's light on the race balance changes, it more than makes up for it with bug fixes.

Surprise, surprise – Mark Skaggs has left EA LA for an undisclosed period of time. Skaggs, known for his work on Red Alert and Battle for Middle Earth, left to reportedly spend more time with his family. With Red Alert unofficially announced by Skaggs shortly after work was finished on BfME, it's unknown if development will continue.

Currently there's a Bill under consideration in Washington state that would hold game 'manufacturers and retailers' accountable for violent crimes perpetrated by children under the age of 17. While violent games, just like movies, can have an effect on children, the bill is further proof that the mainstream media campaign against video games is gaining momentum.

Troika rolls d20 critically fails

The last few years have been unkind to independent developers, and signs show that 2005 is to be no different.

While news of game developer Troika's demise spread slowly through normal channels, it was Ash Wednesday as far as the fervent CRPG community was concerned. The catalyst in this case: A questionable email stating Troika was selling off its computer equipment.

Game over for the developer was finally confirmed once the inferno hit popular role-playing site No Mutants Allowed. Not wishing to do their fans a disservice, two employees of the company posted on the website's forums, making it clear that Troika was no more.

Despite the insight provided by the ex-Troika workers, there was still no official word on what was happening with the developer. So, we got a hold of Leon Boyarsky, one of the company's co-founders, to solidify the hazy picture forming online.

Boyarsky was surprised the news took so long to come out.

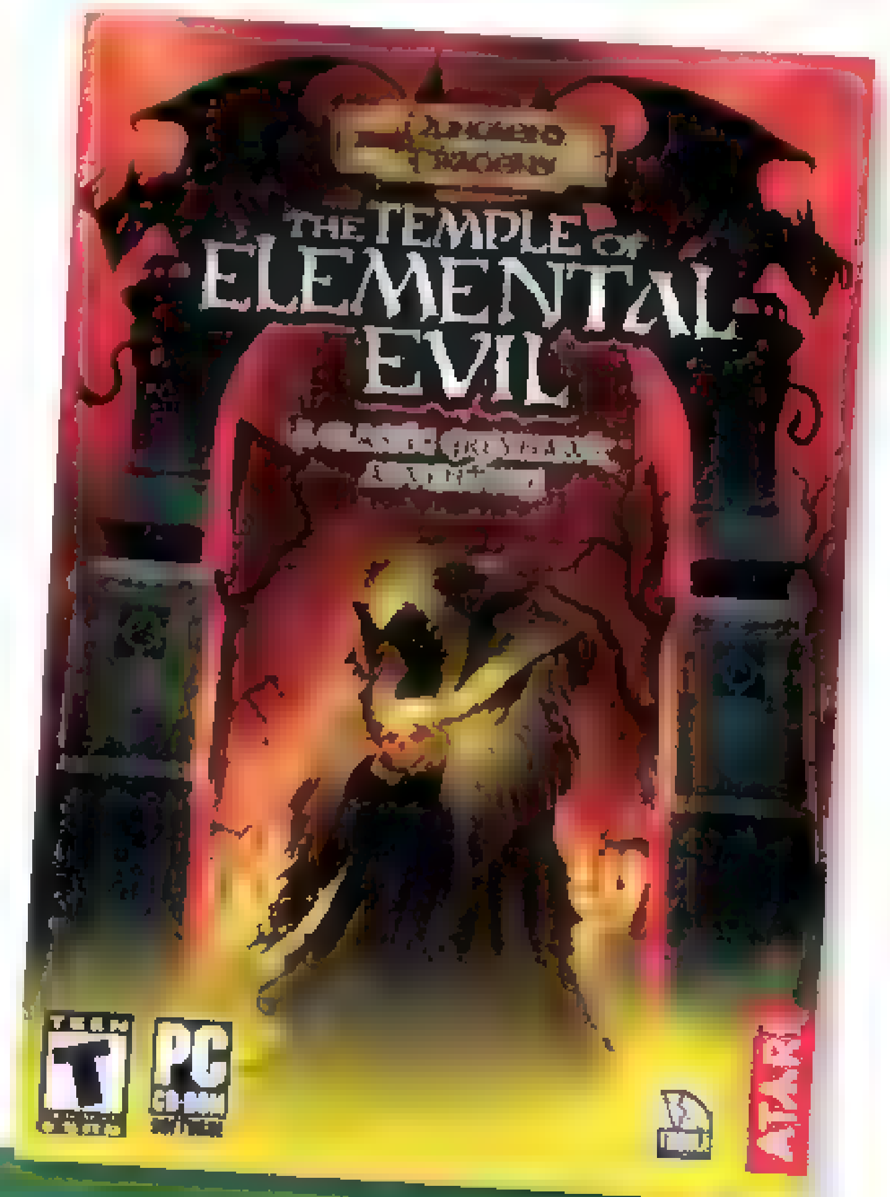
'Near the end of ToEE [Temple of Elemental Evil] we thought we'd be needing to lay off a lot of the ToEE team because we'd been unable to land a contract in time, but I was able to get Activision to agree to adding more people to the Vampire team, so we were saved temporarily,' said Boyarsky.

'We had our first set of layoffs in November and our second and final set in December.'

Unable to land another contract after Vampire and running short on funds, there wasn't much that could be done. Vampire, Troika's last project, was also released with a multitude of bugs that took some time to receive patching.

'There were a lot of unfortunate things that impacted Bloodlines' development, but funding issues were not part of these difficulties,' assured Boyarsky.

'None of us have any idea what we want to do next. We'd love to keep working together, but we're not sure that's going to be possible, or whether all of us will even stay in the industry.'

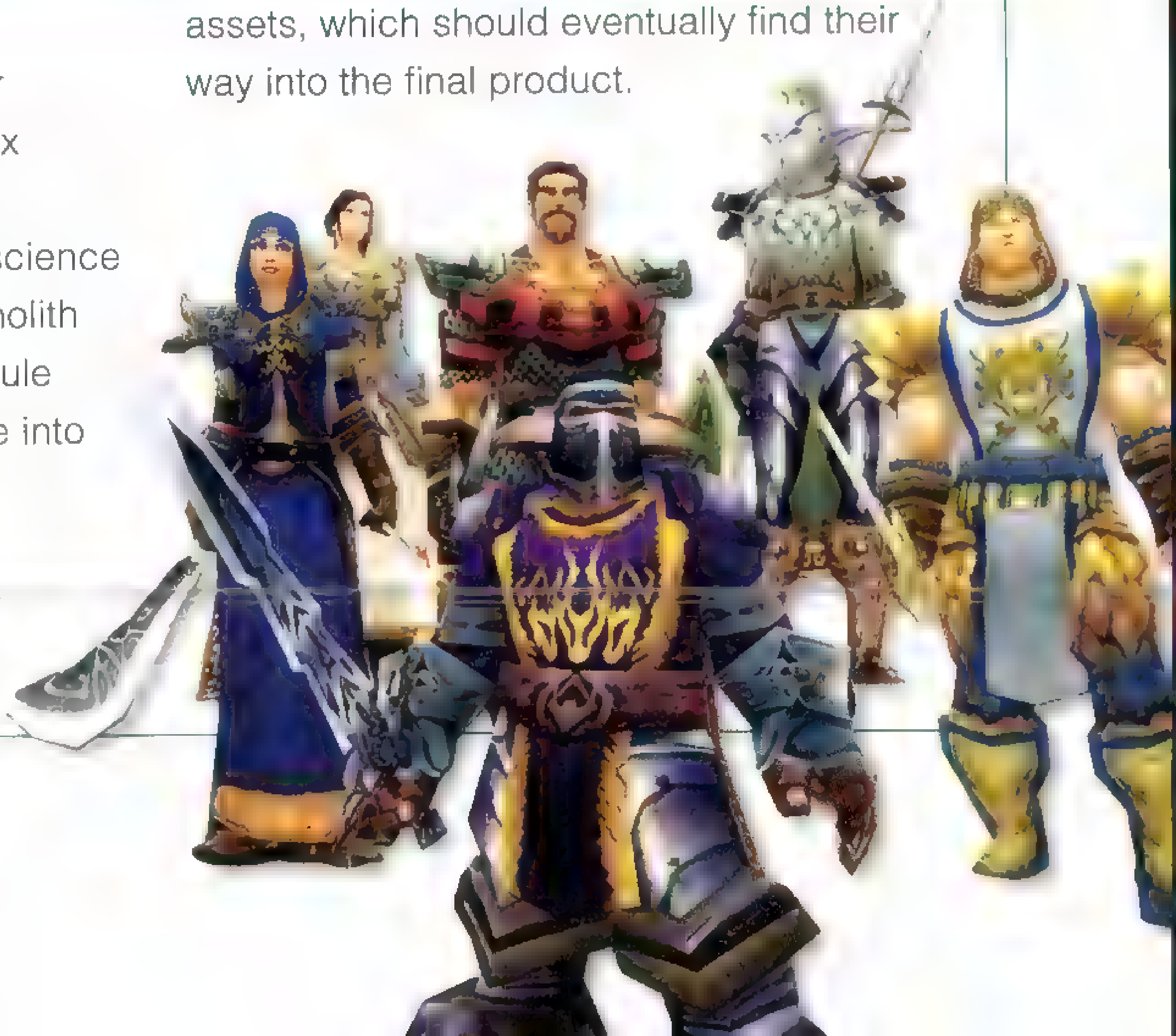


ping: patches, betas and guilds, oh my!

After many months of promises regarding content patches for World of Warcraft, Blizzard has finally delivered. The company has dropped its plans to release big content updates every couple of months in favour of smaller, more regular updates. What this means is that, while the promised PvP Battlegrounds are still a month or two off, balance changes, new high-level content and numerous bug fixes are on their way now, rather than later.

By the time you read this, the Matrix Online should be available for play. Whether it will be *playable* is another question entirely. Like Blizzard, Matrix Online is Monolith's first MMO and compounding the already unstable science behind running an online game, Monolith has set itself a crazy beta/live schedule that compacts the final testing phase into a single month.

Meanwhile, Guild Wars continues to chug away with its beta. No major complaints yet, except for missing assets, which should eventually find their way into the final product.



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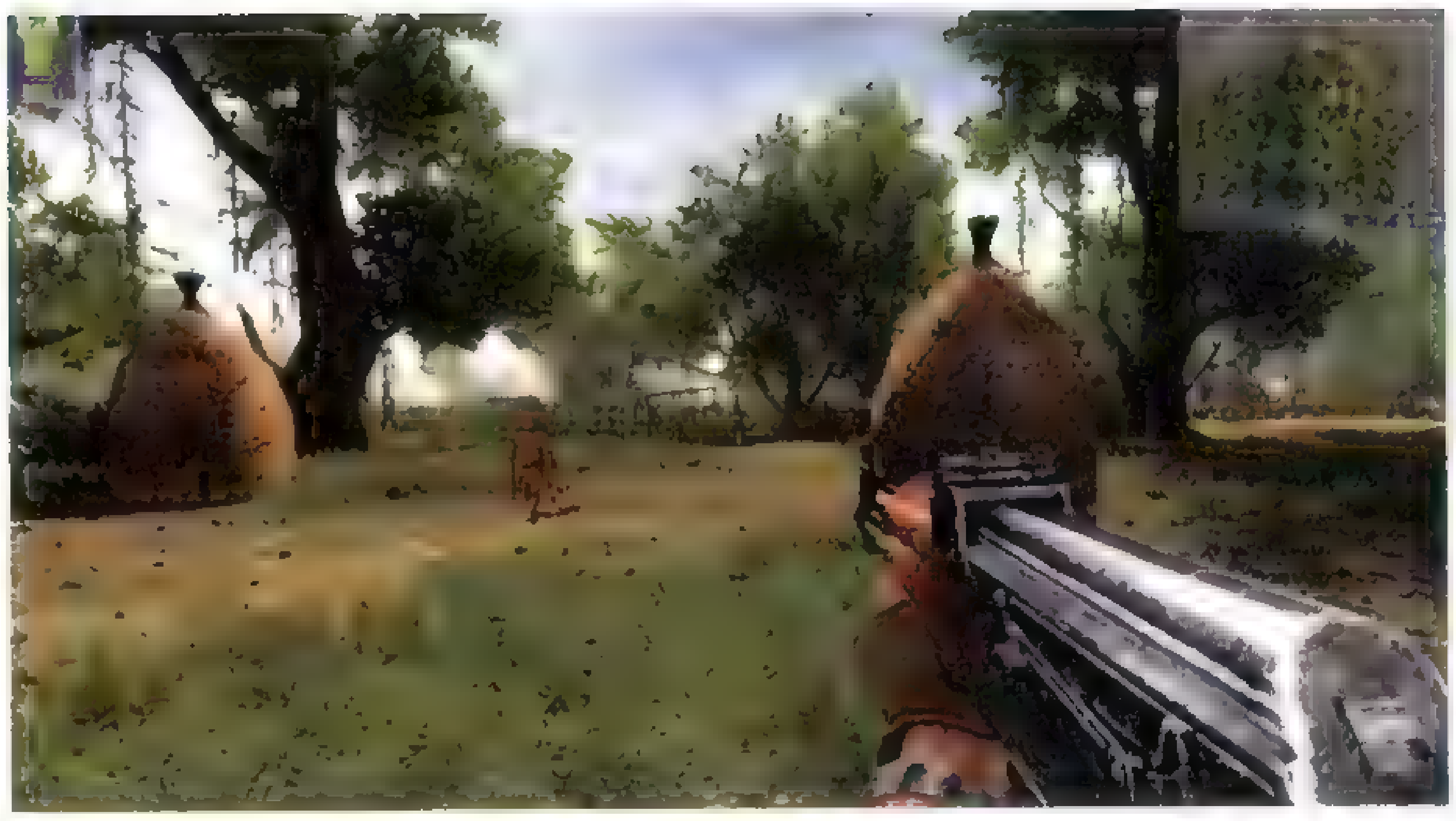
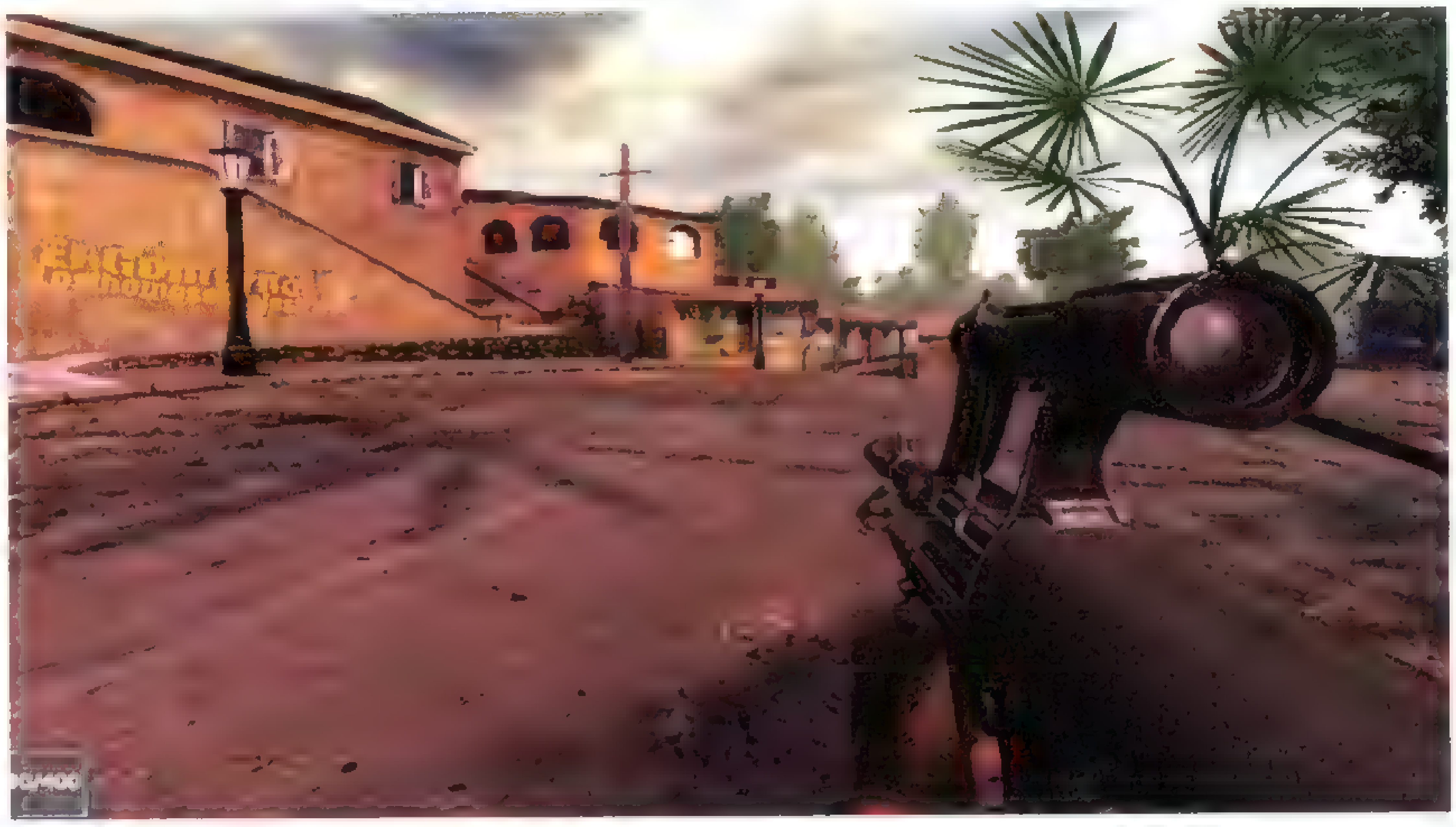
Boiling Point: Road to Hell

My AK-47

Taking a page from GSC Gameworld's S.T.A.L.K.E.R., Boiling Point: Road to Hell puts the player in the shoes of Saul Meyers, a Legionnaire-trained mercenary who must balance his reputation among a number of factions while fighting – or sneaking – through kilometres of tundra. The difference is that while S.T.A.L.K.E.R. plonks your character in the middle of post-apocalyptic Chernobyl, Boiling Point has you fending off foes and making friends in the jungles of South America. To help you out on your crusade to annihilate the bad guys, you can buy a variety of vehicles during play, including jeeps, boats and trucks. The game also makes the experience a little more personal as Meyers must rescue his daughter Lisa from the various evils that await him. While equipped with a decent plot, the game does feature a multiplayer component once you're done with the single player. Aside from this, Boiling Point looks like a competent first-person shooter that boasts seamless loading of its 625-square kilometre world, along with a 3D engine coded entirely in-house by the developer.





Release date **Q2 2005** Platform **PC**
Developer **Deep Shadows**
Website **www.atari.com.au**

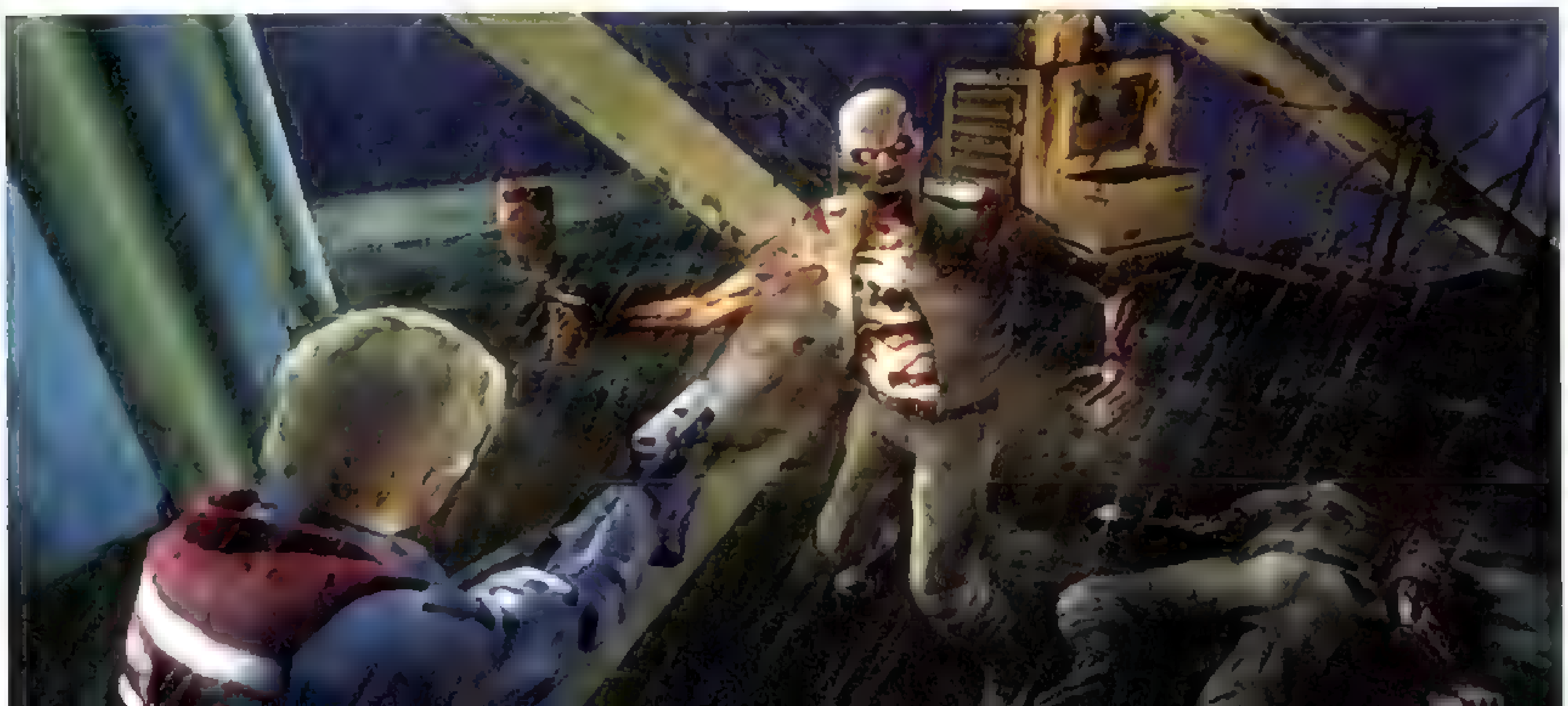
Cold Fear

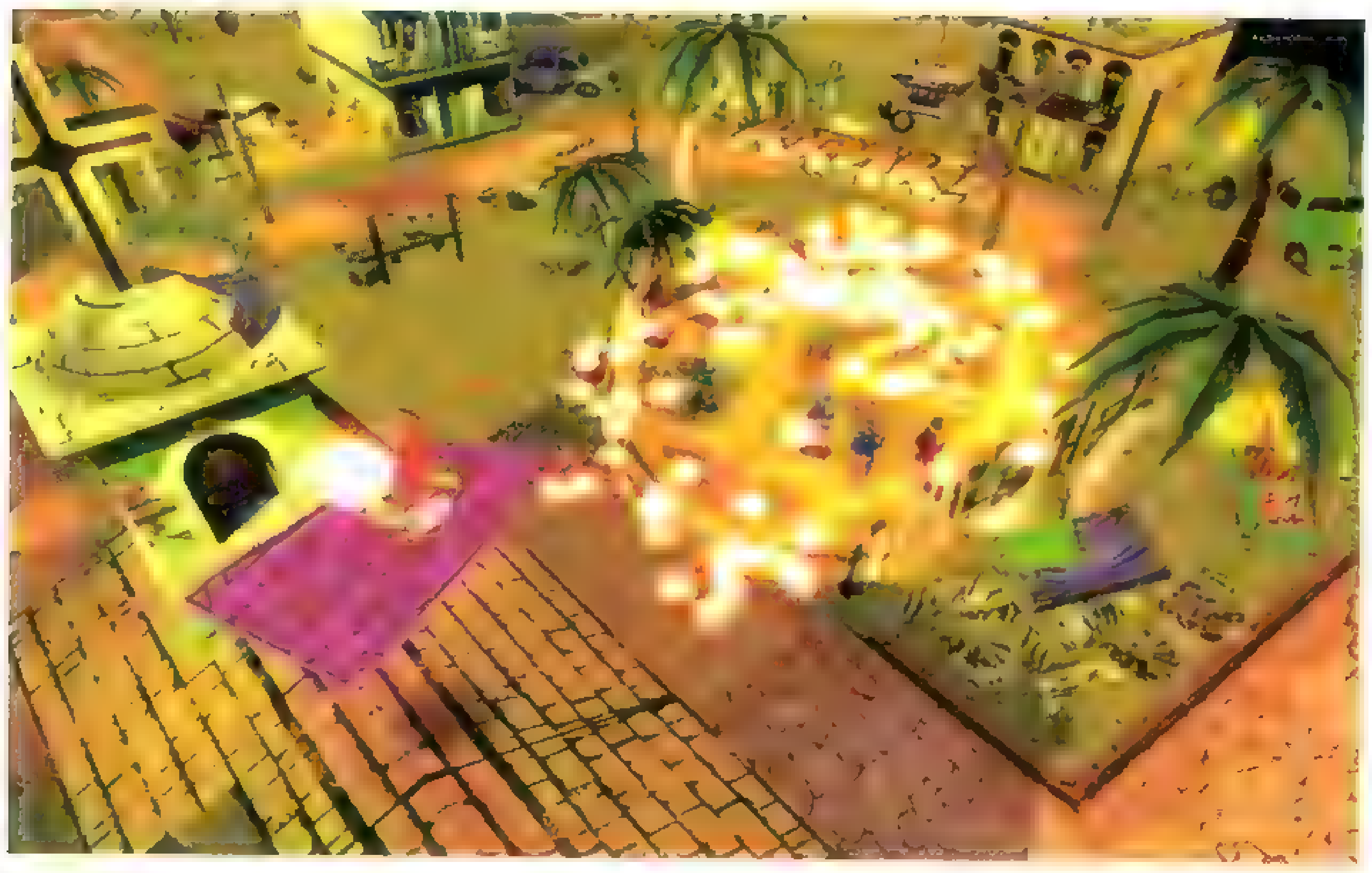
My undead friends

Tom Hansen has a problem on his hands – and it has nothing to do with sharing his surname phonetically with the members of a questionably popular boy band from the 90s. It's all zombies, friends, and when you're stranded on a whaling boat teaming with undead Russians in the middle of the Arctic, there's only one thing you can do: Crack out the Vodka and hope they like shanties.

Cold Fear marks Ubisoft's entrance into the survival horror market and the focus is all on atmosphere. From the creaking hull to the creepy shadows, you'll spend as much time torching demonic sailors with flamethrowers or popping melons with 9mm rounds as you will screaming like a 12-year old Girl Scout.

Release date **Q1 2005** Platform **PS2** Developer **Darkworks** Website **www.coldfeargame.com**



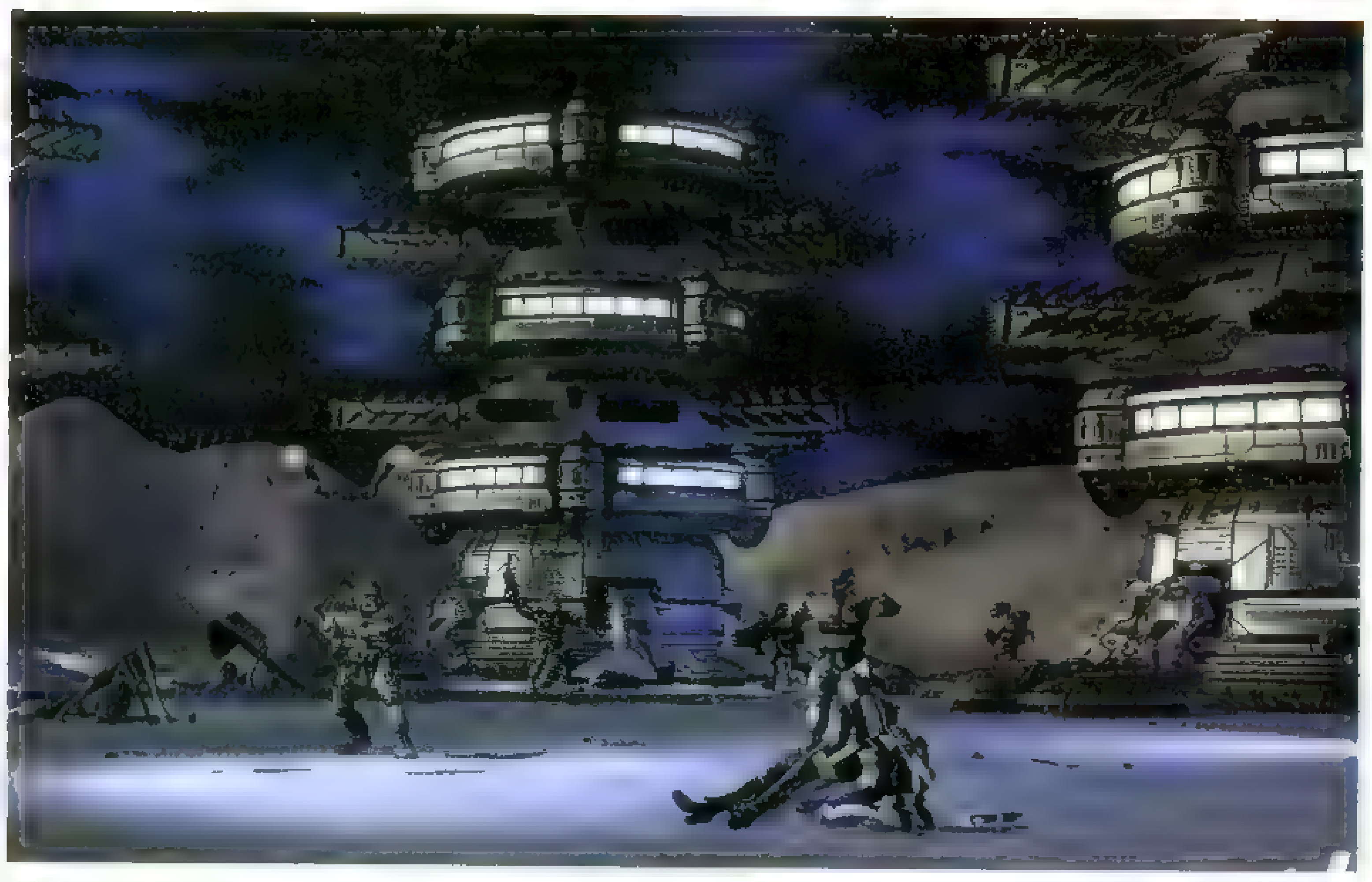


Freedom Force vs The Third Reich

My magic carpet

Short of rolling around in a puddle of radioactive goo, your chances of becoming a superhero through normal-day activities are slim. We're not sure if it was this that motivated Irrational to make the first Freedom Force, but regardless it gave players the opportunity to create their own super character with infinitely customisable abilities. Well, Irrational is back with The Third Reich, throwing players back into their capes to fight in the battlefields of WW2.

Release date **Q1 2005** Platform **PC** Developer **Irrational Games**
Website **www.freedomfans.com**

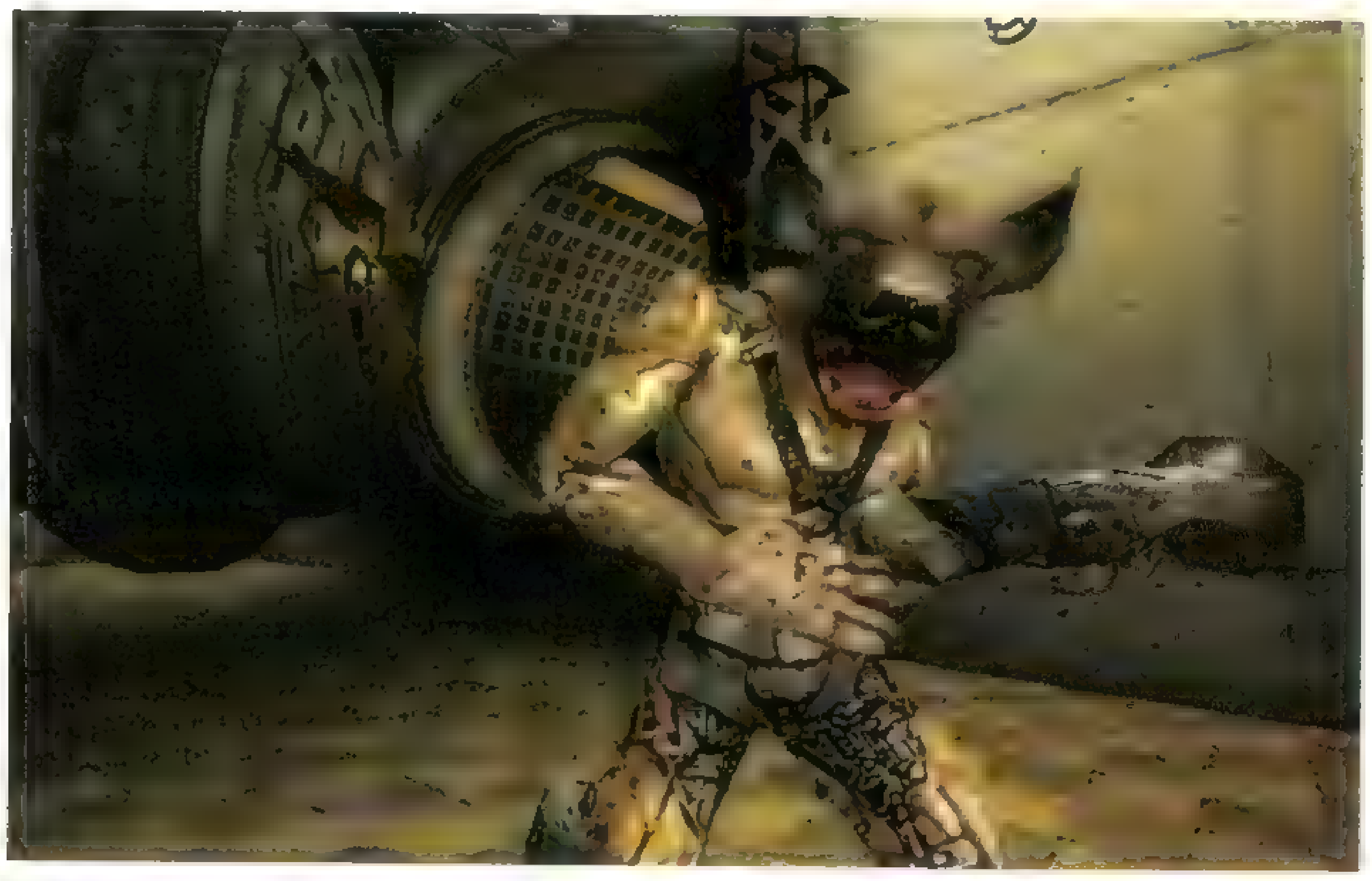


Earth 2160

My little men

The first game was Earth 2140, and the second Earth 2150. So it should come as no surprise that the third title is Earth 2160. Developer Zuxxez once again resurrects its RTS series to pit the Eurasian Dynasty, United Civilised States and Lunar Corporation against one another. Apart from a sexy 3D engine, players can also expect a bit of an 'adventure' element. Whether this means an RPG component or another twist on gameplay, we'll have to wait and see.

Release date **Q2 2005** Platform **PC** Developer **Zuxxez Entertainment**
Website **www.earth2160.com**

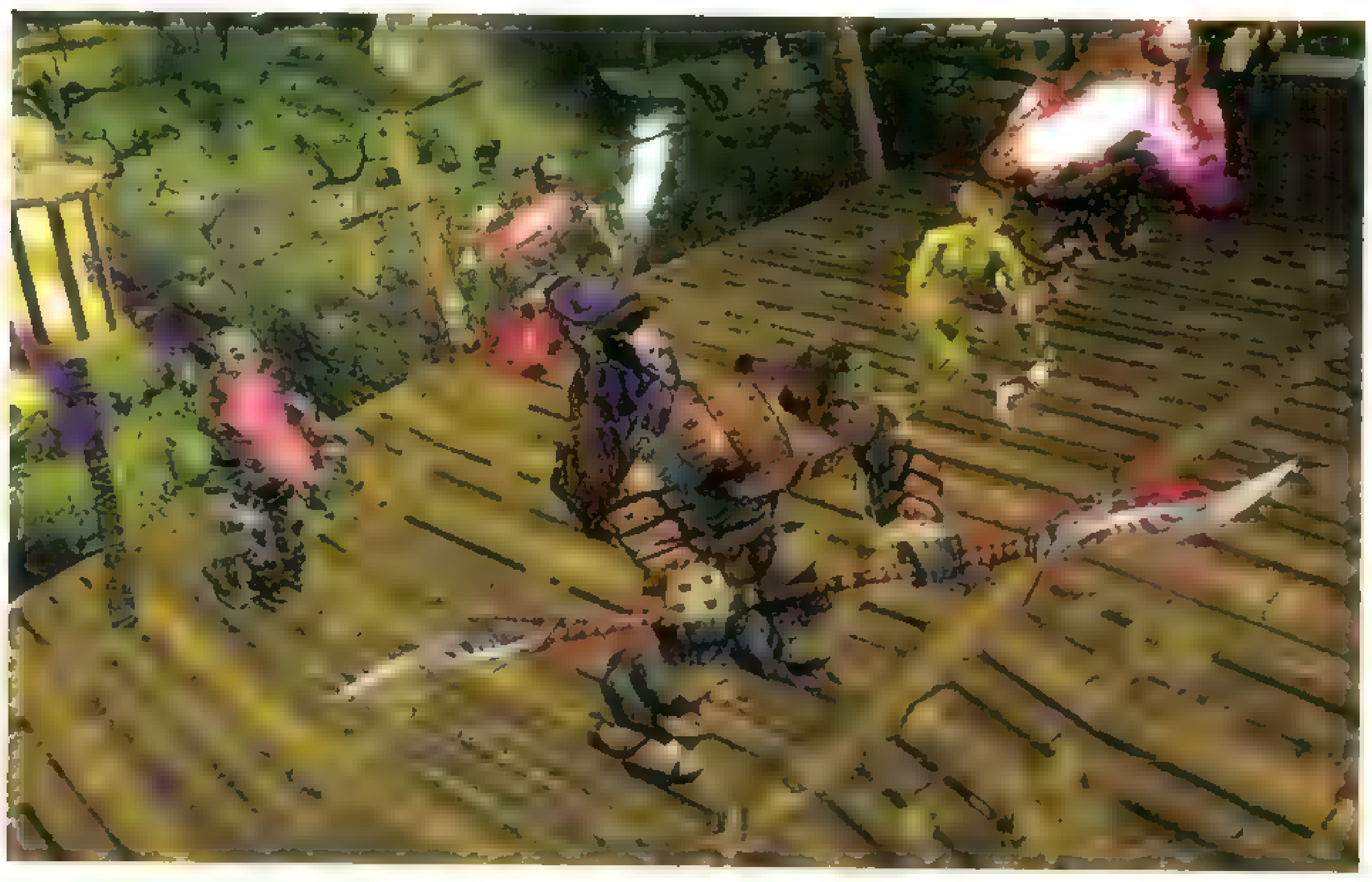


Vivisector: Beast Inside

My human hybrids

If the *Island of Dr Moreau* made you pitch a tent, then Vivisector will have you waltzing around with a circus marquee secured to your hips. A crazy doctor on a mysterious island is experimenting with animals to give them human qualities – including the ability to hold guns and kill. As the player, you're not exactly sure how you ended up facing these legions of freakish human/animal hybrids, but you do know they all have to die. It's a gory game with a nifty looking engine.

Release date **Q2 2005** Platform **PC** Developer **Action Forms**
Website **www.vivisector.com**



Dungeon Siege II

My magic weapon

Chris Talyor is back with the next installment for Dungeon Siege, aptly named Dungeon Siege II. Gas Powered Games has taken the slick interface of the first game and combined it with a deep story and more engaging gameplay – two things that were lacking from the original. Of course, Taylor likes his random and seamless worlds, so expect plenty of replayability. And, looking at the screenshot, it ain't too hard on the eyes either.

Release date **Q3 2005** Platform **PC** Developer **Gas Powered Games**
Website **www.gaspowered.com**

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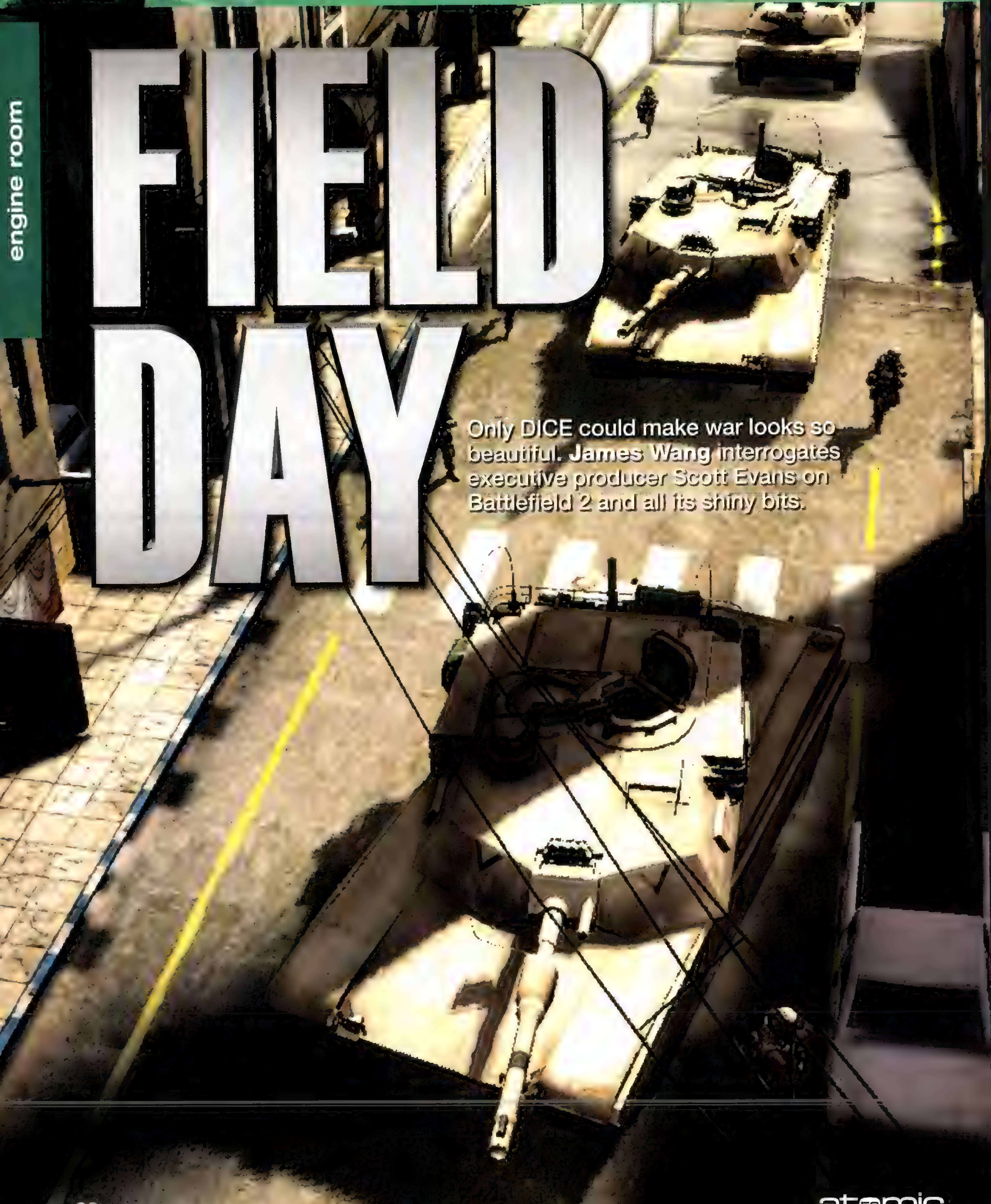
FIELD DAY

Only DICE could make war looks so beautiful. **James Wang** interrogates executive producer Scott Evans on Battlefield 2 and all its shiny bits.



The original Battlefield 1942 has proven to be as popular as it is enduring. Its addictive cocktail of real weapons, huge maps and superb team play inspired numerous other games to follow in its footsteps, while the original spawned various add-ons. The graphics engine was made to run on as many machines as possible and as such, it was fairly conservative. Pixel-shaded water was about the only highlight. Battlefield 2, set in the present day, is a completely different story.

The burdens of keeping up with advanced rendering techniques and increasingly detailed art have resulted in longer development cycles. This has forced many developers to licence graphics, physics and sound engines from other companies. Some developers have gone as far as to outsource the creation of art and game assets.

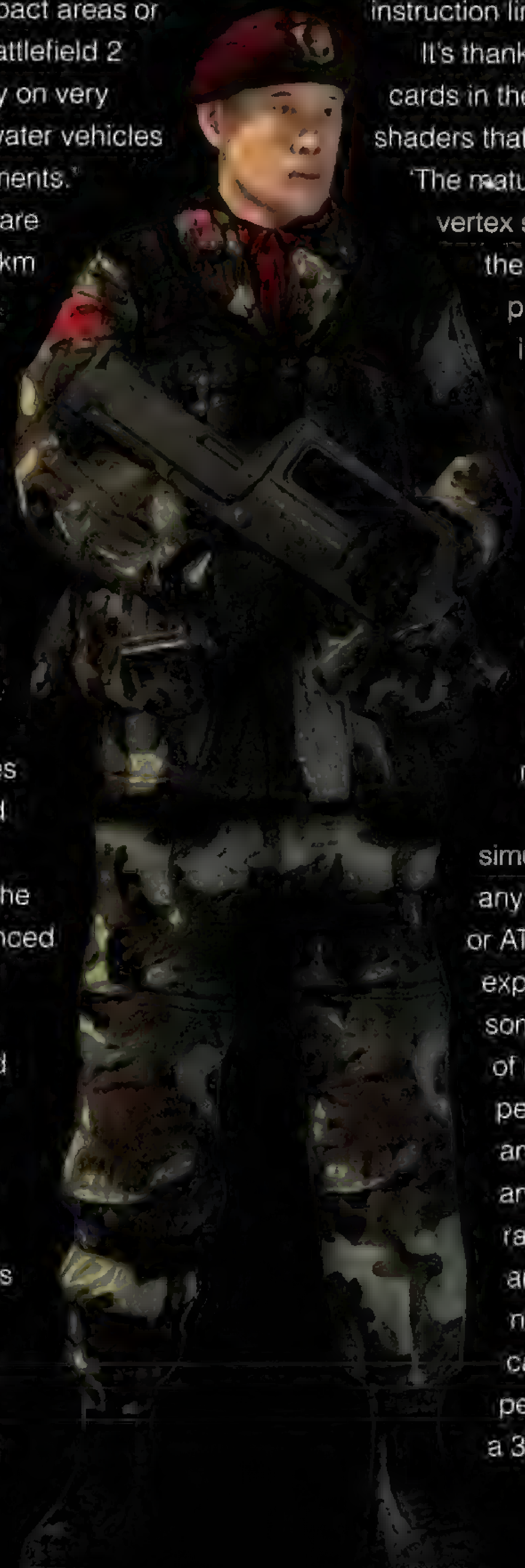
Reverse course

The developers at DICE for Battlefield 2 have taken the exact opposite approach. 'We wanted something that would create a unique look for Battlefield 2, and as a result, all lighting, shadows and materials are in-house tailor-made shader techniques for BF2,' says Scott Evans, the game's executive producer.

The in-house engine has two objectives: to support massive, scalable maps while at the same time render intricate details. Often these two are mutually exclusive. This graphics engine proves otherwise.

'The most unique feature [of Battlefield 2] is something that most people will take for granted: The sheer size of the area you can play in,' says Evans. 'If you compare other games currently out in the market, you are either playing in small, compact areas or constantly reloading. The Battlefield 2 engine allows people to play on very large areas, using air/land/water vehicles in a huge variety of environments.'

The maps in Battlefield 2 are not only fairly large (about 4km squared), but also scalable. If only a few people are running around in a 32-player server, then the size of the map, the number of control points and number of vehicles will scale down accordingly. The idea is to create concentrated action no matter how many or how few people are playing.



While large outdoor games are plentiful, few look refined when viewed up-close. To reproduce the finer details, the engine has to support advanced lighting models and be fed with high quality source art. Battlefield 2 is well equipped on both fronts.

Whereas Battlefield 1942 looked rather flat, the sequel has one of the most sophisticated lighting models in a first-person shooter. The engine has thousands of shaders to describe a huge range of material-light combinations. With everything turned on, even Shader 2.0 struggles with its instruction limits.

It's thanks to the proliferation of cards in the market that support shaders that has made this possible. 'The maturing of both pixel and vertex shader models, as well as the improved precision they provide, has had a huge impact on both the design of the rendering engine, and the beautiful results you can see in the game. Because of the longer shaders that are available, we've been able to push our lighting models way beyond what used to be standard in previous models,' explains Evans.

In fact, the lighting model simulates so many techniques, any combination of NVIDIA or ATI buzzwords would explain it equally well. It has some ray-tracing, a smear of radiosity, a good deal of per-pixel bump-mapping and plenty of dynamic lights and shadows. Granted, the ray-tracing is pre-computed and the radiosity is no where near accurate, but who can complain at less than perfect global illumination in a 3D game? →

> The logic behind this is fairly simple; things in the real world are lit one way or another, but not by some undefinable light source.

No more ether

Up until now, there was a whole generation of outdoor games that simply looked flat. Most of the Unreal and Quake engine-based games and almost all war shooters fall into this category. The flatness was in the lighting – everything appears to be lit by some magical ether in the air; there was a sense that objects were lit evenly with no good reason. This is largely the result of ambient lighting – a constant, omnipotent light value that is applied to every object in a game to make sure nothing is obscured. While it conveniently makes everything visible, it also strips objects of lighting subtlety and credibility.

In Battlefield 2, the constant ambient colour is replaced by a dynamic one. The logic behind this is fairly simple; things in the real world are lit one way or another, but not by some undefinable light source. Instead, they are lit by reflected light from other objects. Battlefield 2 will use a form of environment lighting to simulate this. So in the game, a chopper's top will pick up some blue from the sky while the bottom will get a hint of brown from the earth. This type of environment lighting, picking separate ambient lighting values for the top and bottom of a scene, is known as hemisphere lighting.

Realtime hemisphere lighting is a simple addition but an important step forward. The ability for the environment to 'bleed' its colours onto objects is a feature previously restricted to very expensive radiosity renderers. In Battlefield 2, most of the colour bleeding comes from the terrain. 'What we do is pre-render a top-down view of the world, and use this texture to simulate local environment lighting,' says Evans..

In essence, the entire map is used as one big texture. As dynamic objects such as characters and vehicles move around, they sample this texture according to their corresponding location on the map. This way, as an object, say a MiG, moves across the map, it will pick up different ambient colours as it goes from desert to tundra, cities to sea.

The final colour value will account for many light sources, such as the sun and sky as well as local and environment lights. 'For each pixel normal, we interpolate between the environment colour at that position and a static colour representing the sky, and that becomes our shadowed side bump-mapped environment light term. We then do the regular DOT3 bump against the directional light, and we mix these two factors together to create a lighting that really places the object in the world,' says Evans.

The end effect is often subtle. In some scenes where the map is sparsely populated, it still seems a little flat. But the denser and richer maps, namely the Middle-Eastern cities, look absolutely stunning.

Soldiers and vehicles are lit intensely by the sun with a faint supporting glow gained from the sky and the surroundings.

When a weapon is fired, an extra layer of depth is created, with dynamic highlights and shadows sweeping the scene.

Added to this is what appears to be a greater dynamic range in the rendering system, giving directly lit objects an intense but well defined glare while allowing rich and engrossing shadows.

As soldiers move in and outdoors, the lighting system ties together the static and dynamic components, creating startling depth and credibility.

A good engine is useless without good game content to show it off. And even with good content – as with many games – without art direction, the pieces simply fail to fit together. For Battlefield 2, the attention to detail in this regard is similar to that of GSC Gameworld's STALKER.

Battlefield 2 has some of the most authentically reproduced Middle-Eastern cities in any game. It's not just the Mosques and tattered streets we've come to expect from previous titles. In Battlefield 2, every detail is there. Corner stores have gritty Islamic sign boards. Busy residential rooftops are lined with a mishmash of antennas, pointing in every direction. On balconies, bed sheets hang to dry next to rusty air conditioners. And that's just the buildings. The aircraft models can stand right next to those of flight simulators. With much more sophisticated lighting, it can even rival them. Texture work is just as amazing. The engine resolves details as coarse as the cracks in the concrete to features as fine as the chequers of a headscarf.

It would be unfair to finish up without mentioning the sound engine. You've heard of all the descriptions before: 'It made me duck' or 'It's so real my room rumbled'. Without resorting to the clichés, let's just say the sound effects in Battlefield 2, because of the advanced sound engine, or due to live field recordings, or perhaps the use of stereo weapon effects, are Hollywood quality. There's not a hint that any sound effect is symbolic. Everything is so detailed and well-defined that it could easily win an Oscar for sound editing.

We could go on forever about Battlefield 2. We've just talked about the engine technology. The gameplay is loaded with new features from scalable maps to commander mode. But it's probably easier for you to go online and watch some videos for yourself. My father thought they were as good as movie trailers. I can't disagree.

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Gran Turismo 4

Ron Osborn learns to drive his stick.

Dodge this.

It's been almost four years in the making and the good news for Gran Turismo fans is that the fourth installment has been well worth the wait. For those who haven't yet experienced the 'real driving simulator,' GT4 makes for an excellent introduction, and is easily the best of the series.

GT has always combined great graphics and a wide range of driving experiences, and GT4 shows that Polyphony Digital has refined this to an art form. As the screenshots show, the game looks amazing. The cars are exquisitely detailed, with realistic shadow and lighting bringing them as close to real as we've seen in a game.

One of the great things about GT4 is that you can adapt the game to your playing style. There's almost nothing you can't configure in the game, and there are more options than ever before. The game even caters for those that don't want to drive with the new B-spec director's mode. Here you manage an AI driver, telling them when to overtake and how aggressive to be. The AI is nowhere near aggressive enough though, making this mode more of a distraction rather than a serious alternative to driving the races yourself.

The heart of the GT series has always been the realistic driving physics and the sheer number of cars and events available. In this respect GT4 does not disappoint. You'll notice the difference after changing the gear ratios or redistributing weight and appreciate the handling nuances of individual cars. Plus, with over 650 cars to push to the limits, this game will keep you busy for a long time.

It's not a perfect product. There are a few hang-ups brought over from the previous games such as unintuitive menus and the manufacturer-friendly physics. Though the inability to seriously damage the cars isn't a major drawback, the ability to slam a car into a corner at speed using the wall as a guide rail, does have an impact on the realism factor, particularly in the tight, winding city circuits.

Finally, Polyphony has capitalised on the drool factor of the graphics with the introduction of the new photo mode. Now you can take a replay, pause it, position the camera and take the perfect action shot. As per usual GT style, you can tweak everything from aperture to exposure – there's no excuse for a shoddy photo.

While there is nothing revolutionary about GT4, the refinement and scope of the game raises the bar for driving games that much higher. It's the most comprehensive and enjoyable driving game on any platform and even if you don't think you're into driving games, you should give this a go. You won't be disappointed.

hotaward

PS2

Developer **Polyphony Digital**
Website **www.granturismoworld.com**

Players **6 (System Link)**
Other platforms **No**

VERDICT

A visual feast; highly refined; photo mode; the best of the GT series. ✓

Not completely intuitive; no car damage; say goodbye to your weekends. ✗

score **9.0** OUT OF 10

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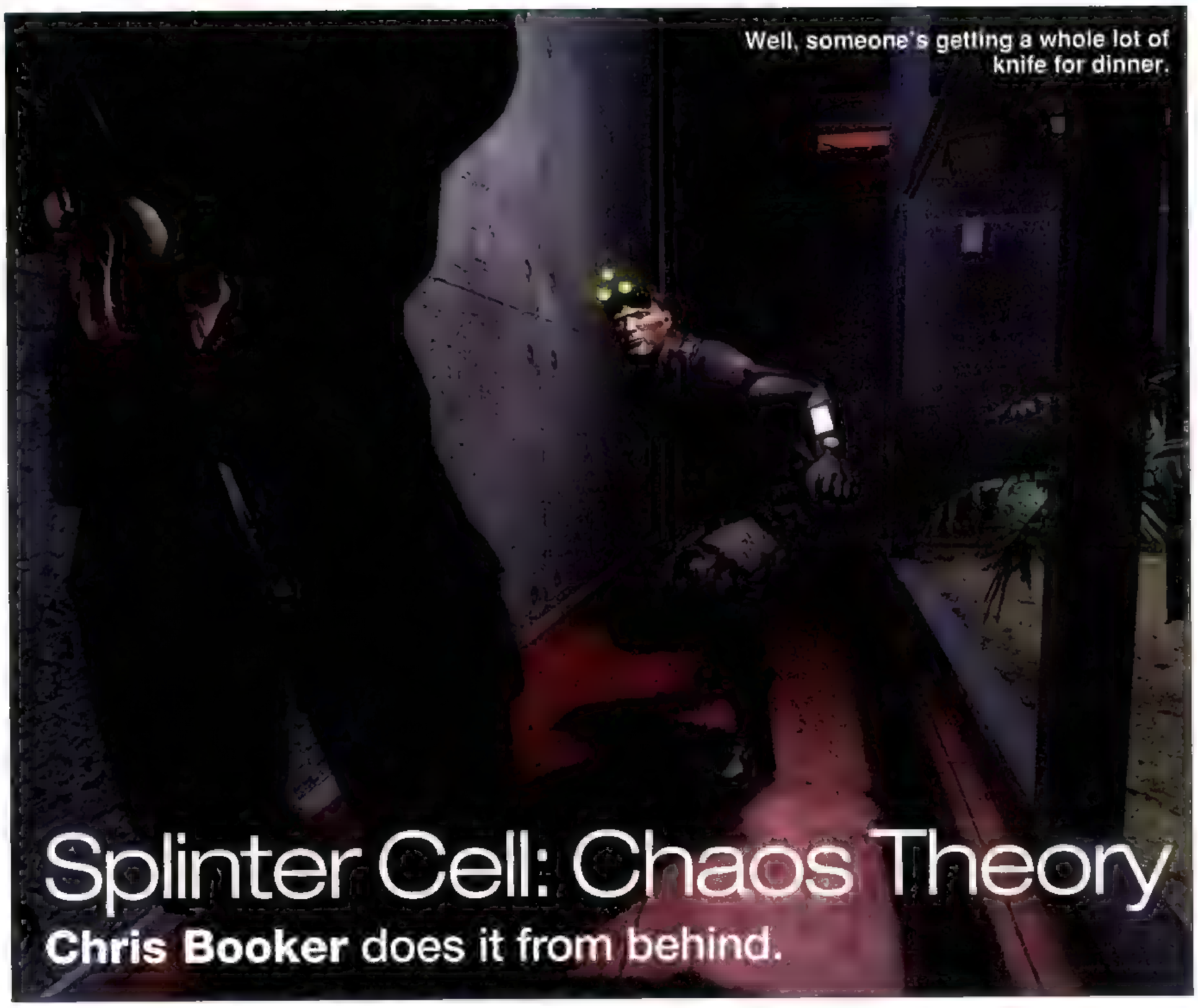
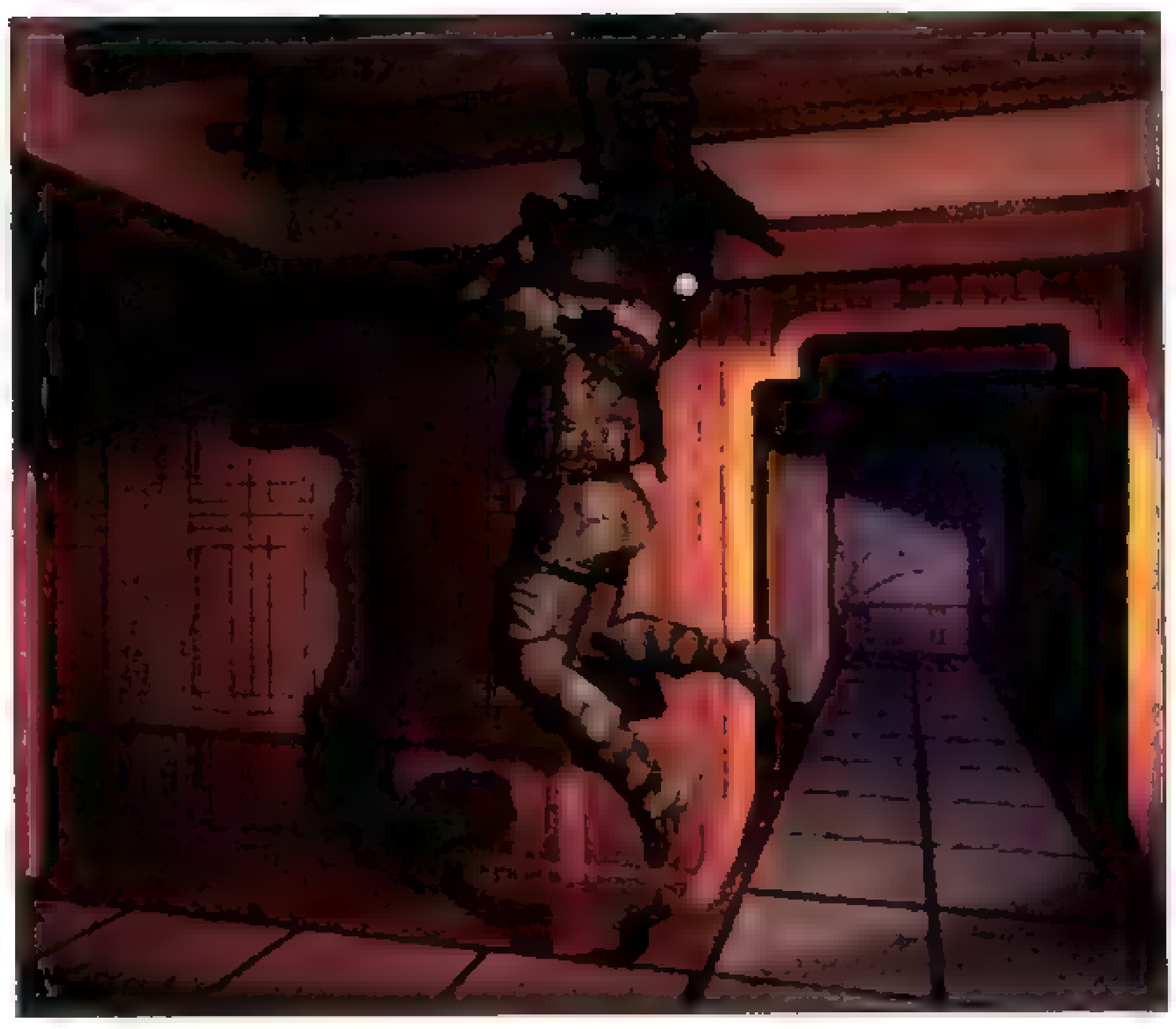
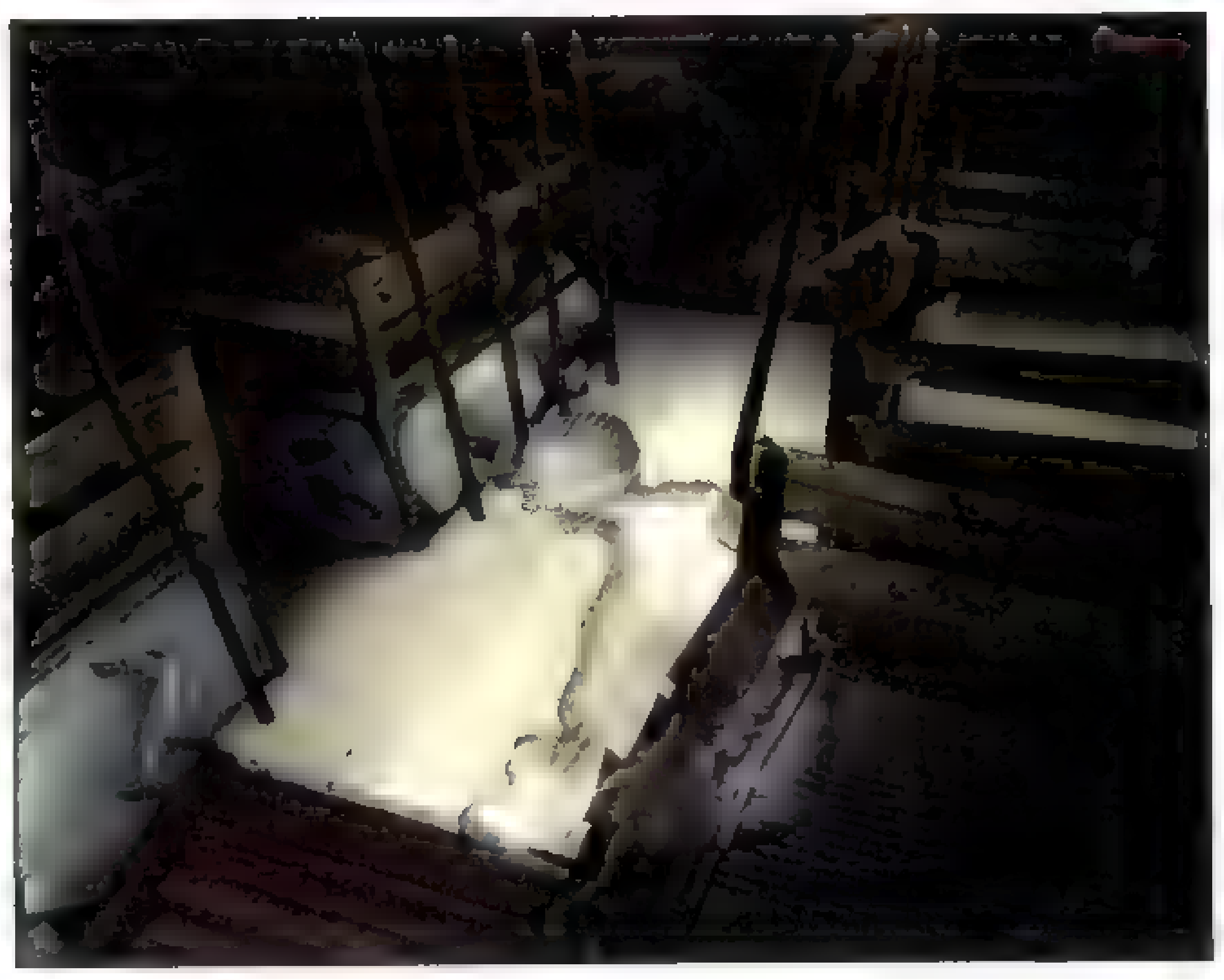


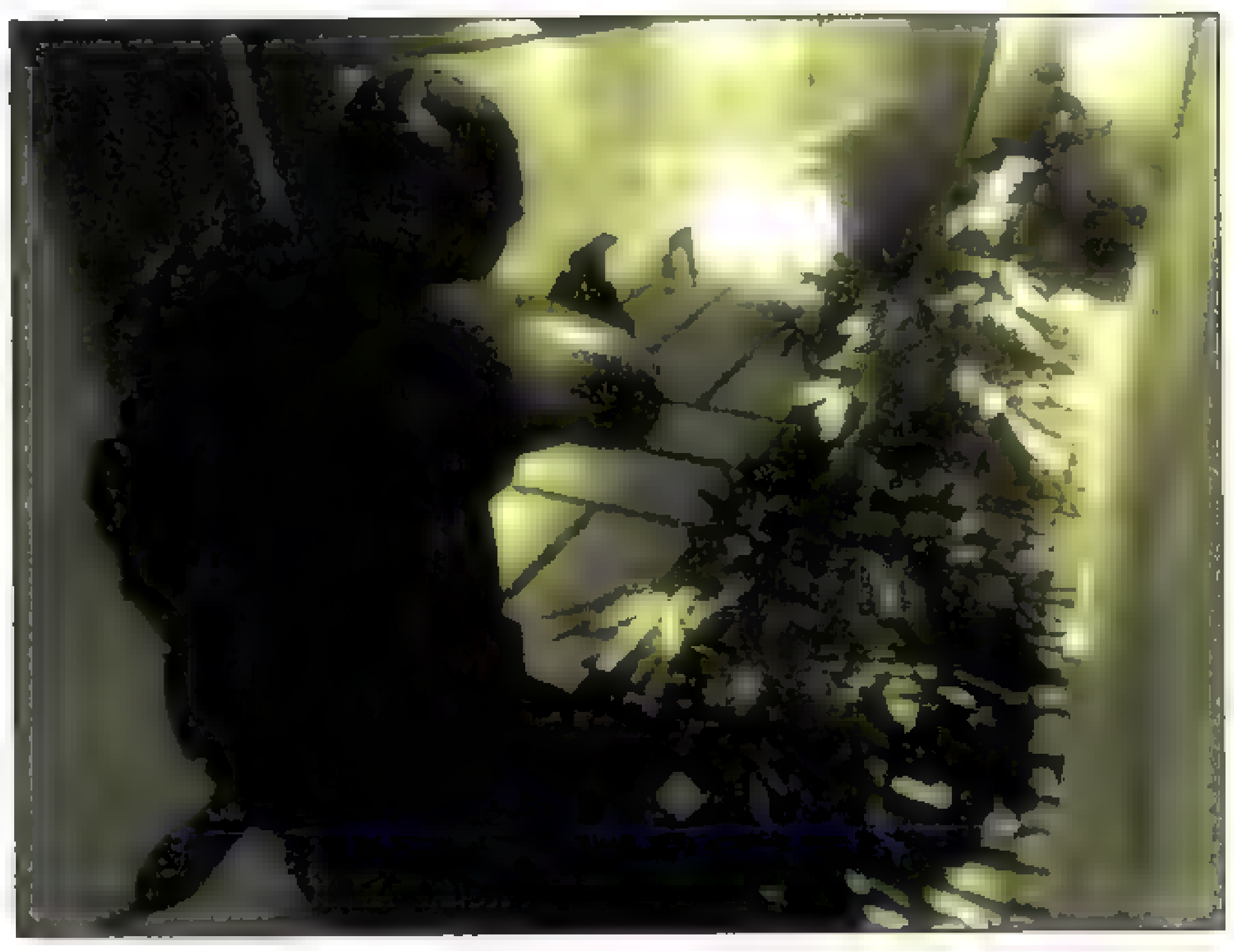
Well, someone's getting a whole lot of knife for dinner.

Splinter Cell: Chaos Theory

Chris Booker does it from behind.







Most of us are familiar with the Splinter Cell series of games. You play the role of Sam Fisher, whose job it is to creep around in places he's not supposed to be and do things he's not supposed to do, all in the interests of world peace

Like the previous titles, Splinter Cell: Chaos Theory has the player stealing items, assassinating important folk and gathering information, and the crux of the game is avoiding or neutralising your enemies while you complete these tasks – all with the assistance of cool gadgets.

For starters, the game is graphically excellent. A great amount of detail has gone into Sam, his enemies and the level design, right down to accurate lip-synching during interrogations. Of course, interrogating isn't the only thing you can do – captured enemies can be used to activate retinal scanners or be wielded as human shields. The option to just dispatch them is also available and, if you want to play nice, you can simply knock them out.

Sam also has some new toys. The commando knife allows combatants to be killed up close. In a pinch, the knife can also be used to break through locks quickly instead of taking the time to pick them, however a broken lock will be spotted by guards. Additionally, his pistol now has the ability to disable cameras electronically. The rifle has various attachments including a fore-grip for more accurate firing and a sniper modification. Also back is the classic launcher, which fires remote cameras and various non-lethal projectiles.

hotaward

Hacking provides a new form of puzzle It plays like a modified version of Mastermind and you have to sift through numbers trying to find the right combination before the time runs out. If necessary, you can even hack a computer from a distance, as long as you can handle having less time to work with. By making use of the same device that lets you perform remote hacking, you can scan various objects, this being a regular mission goal

Like Pandora Tomorrow, Chaos Theory also supports co-op multiplayer and versus modes, so if you feel like taking a friend along on your shadowy escapades, or maybe just kicking his arse, then Chaos Theory is your game.

Unfortunately, like the last two games, Chaos Theory is *dark*. As atmospheric as it may be to crawl around in inky blackness, when it's overdone it's just annoying. Also, apart from the new gadgets and other small additions, it's still the same Splinter Cell.

So does it live up to it predecessors? We're glad to say it does. Chaos Theory is well-polished and solid, and fans from the previous titles won't be disappointed

PC

Developer **Ubisoft**
Website **www.splintercell3.com**

Recommended [illegible]
2.0GHz CPU; 512MB RAM; 128MB DirectX 9.0 card.

VERDICT

High level of graphics and character detail; gadgets galore; co-op; smart AI. ✓

Game in general is quite dark; more of the same. That's about it! ✗

score **9.0** OUT OF 10

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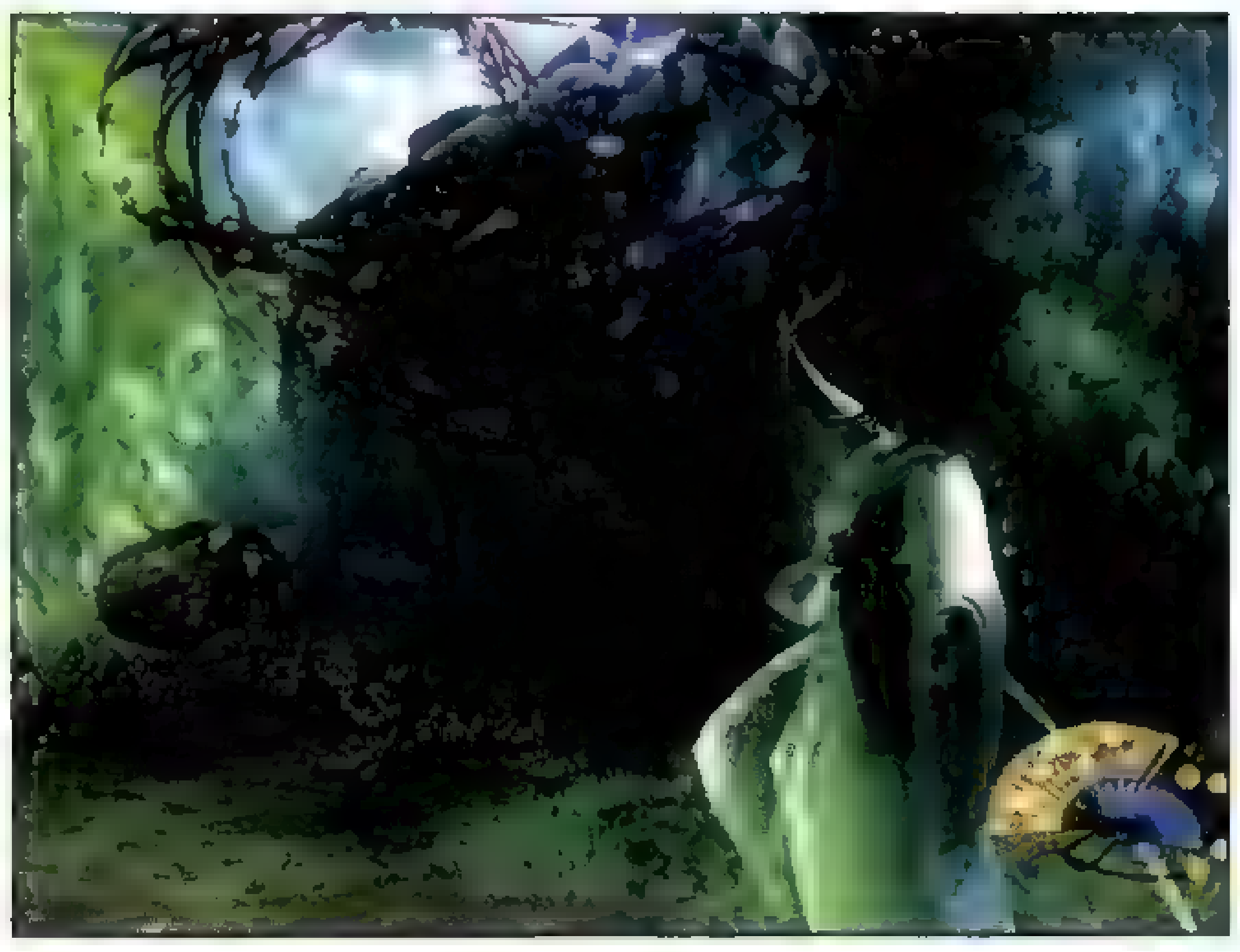
Just think about all the puppies this thing has eaten.



Otogi 2

Is it a crime for a game to look great and be incredibly shallow? **Alex Kidman** investigates.

If you're going to have a game where you relentlessly – and sometimes monotonously – smash demons, then you may as well set it in ancient Japan. That's exactly where Otogi 2 drops you, in a hacking, slashing, spell-casting action game that looks great, sounds terrific but is ultimately let down by its overly repetitive gameplay.

The obvious comparison point for Otogi 2 has to be Koei's Dynasty Warriors series, currently into something like its fifty-seventh iteration. Otogi 2 only being the first sequel seems somewhat tame by comparison, really. Where the first Otogi only gave you one warrior, Otogi 2 offers you six combatants to pick from. You have Raikoh, hero of the first game, along with five other choices who nicely fill out the game's grab bag of mythical and anime stereotypes, from a wolf-headed warrior to a tentacle-wielding tree-trunk-cum-sorcerer who'd look more at home interfering with Japanese schoolgirls than defending ancient Japan.

Each character naturally has their own combat strengths and weaknesses, and it's possible to modify your character to a certain extent thanks to the game's equipment options. Otogi 2 keeps things interesting by forcing you to change characters every time you complete a level. As a result, you'll get pretty familiar with all of the characters as you progress through the game's twenty-odd levels, although the game does make it fairly easy to pick the right character, as it blatantly tells you which characters are best suited to a particular level. Difficulty varies quite a bit, although it only rarely dips into truly hard territory, and beat-em-up veterans will cruise through much of the game's action.

There's one major problem with Otogi 2, and it's a fairly basic one. It's not the visual presentation, which truly deserves superlatives such as 'lush' or 'fancy' or even 'ooh, look at all them sparkly thingies' for that matter. It's not the in-game audio, which features some solid voiceovers and more sounds for things breaking than you ever thought possible. No, Otogi 2's crime is much simpler; it's practically sinful for a game that looks this good to be based around as simple a gameplay mechanic as wailing in and smashing foes willy-nilly.

It's great-looking smashing, mind you, with plenty of floating midair sword-based tomfoolery and landscapes that practically cry out to be devastated by your powerful magic. Indeed, on plenty of levels, you'll do more damage than the demons you're meant to be fighting. Still, after a while even the shiniest beat-em-up reveals its shallow nature, and that puts Otogi 2 firmly in the camp of titles that are fun to play for only a short period of time, especially as there are better alternatives that offer two-player options to boot.

XBOX

Developer **From Software**
Website **www.fromsoftware.jp**

Players **One**
Other platforms **None**

VERDICT

✓ **Lush visuals; variety of characters. Break lots of stuff. Who doesn't love that?**

✗ **Repetitive gameplay; lack of depth; not a great deal of replayability.**

score **7.0** OUT OF 10

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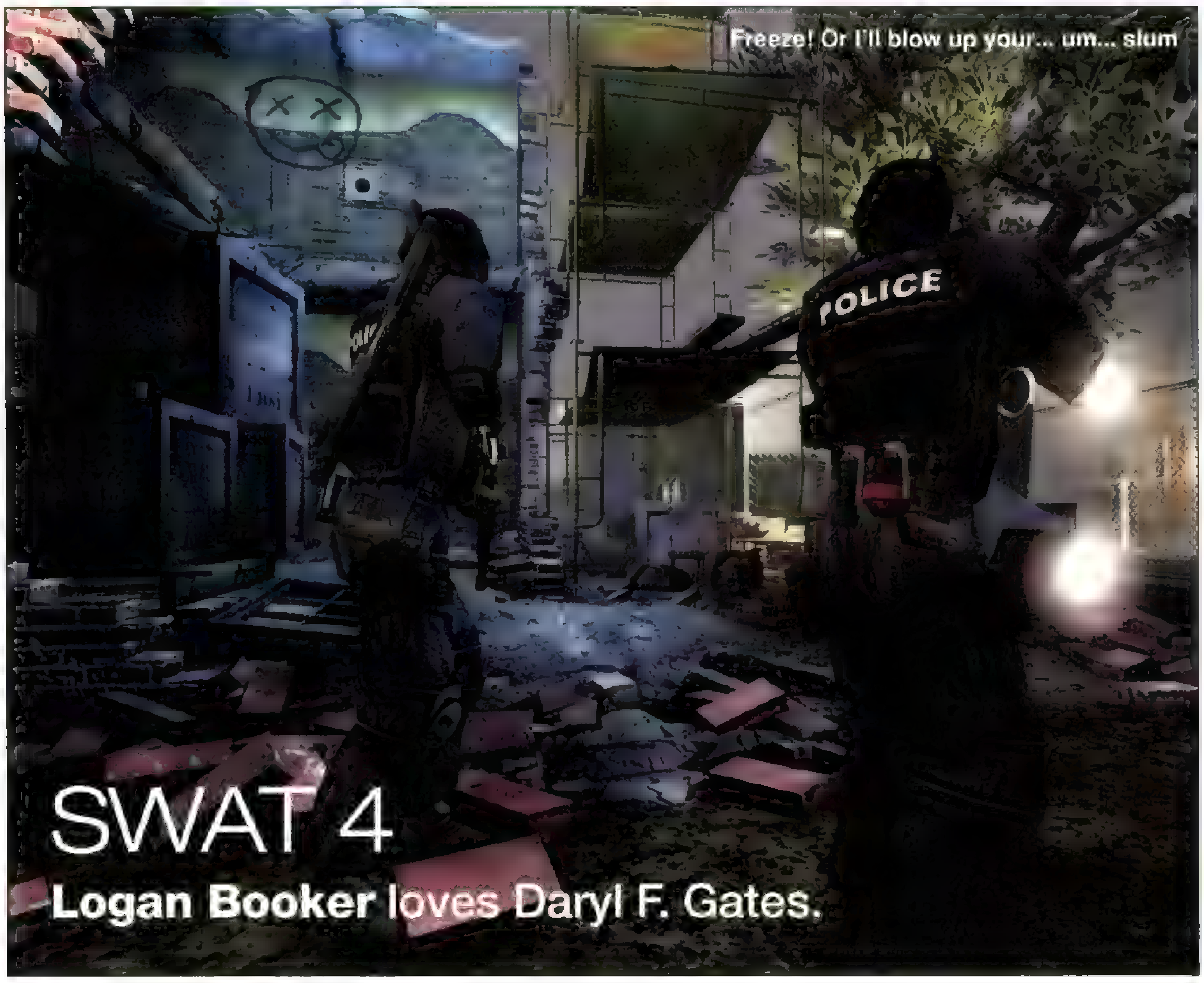


Freeze! Or I'll blow up your... um... slum

SWAT 4

Logan Booker loves Daryl F. Gates.

Few games put you in a situation where you're required to taser an old lady in her own home, whack a set of plasticuffs on her wrists and cover her face in pepper spray. Even less let you throw a flashbang through her bathroom door and listen to her complain about her ailing heart as she stumbles around blind, smashing into various porcelain amenities.

While the above shenanigans may score you a cross on your morality exam in real life, SWAT 4 is all about subduing the guilty *and* innocent alike. Bringing order to chaos, as it were.

Like the previous titles in the series, SWAT 4 has no central plot. Instead, each stage is a separate, unrelated incident. Regardless, you're always in control of three SWAT groups – two entry teams and a sniper. Using this trifecta of manpower, it's up to you to complete all the mission objectives – which vary from securing evidence, rescuing teens and capping street punks – while keeping in mind you're a police officer. To this end, SWAT 4 is more about tactics and taking things slow.

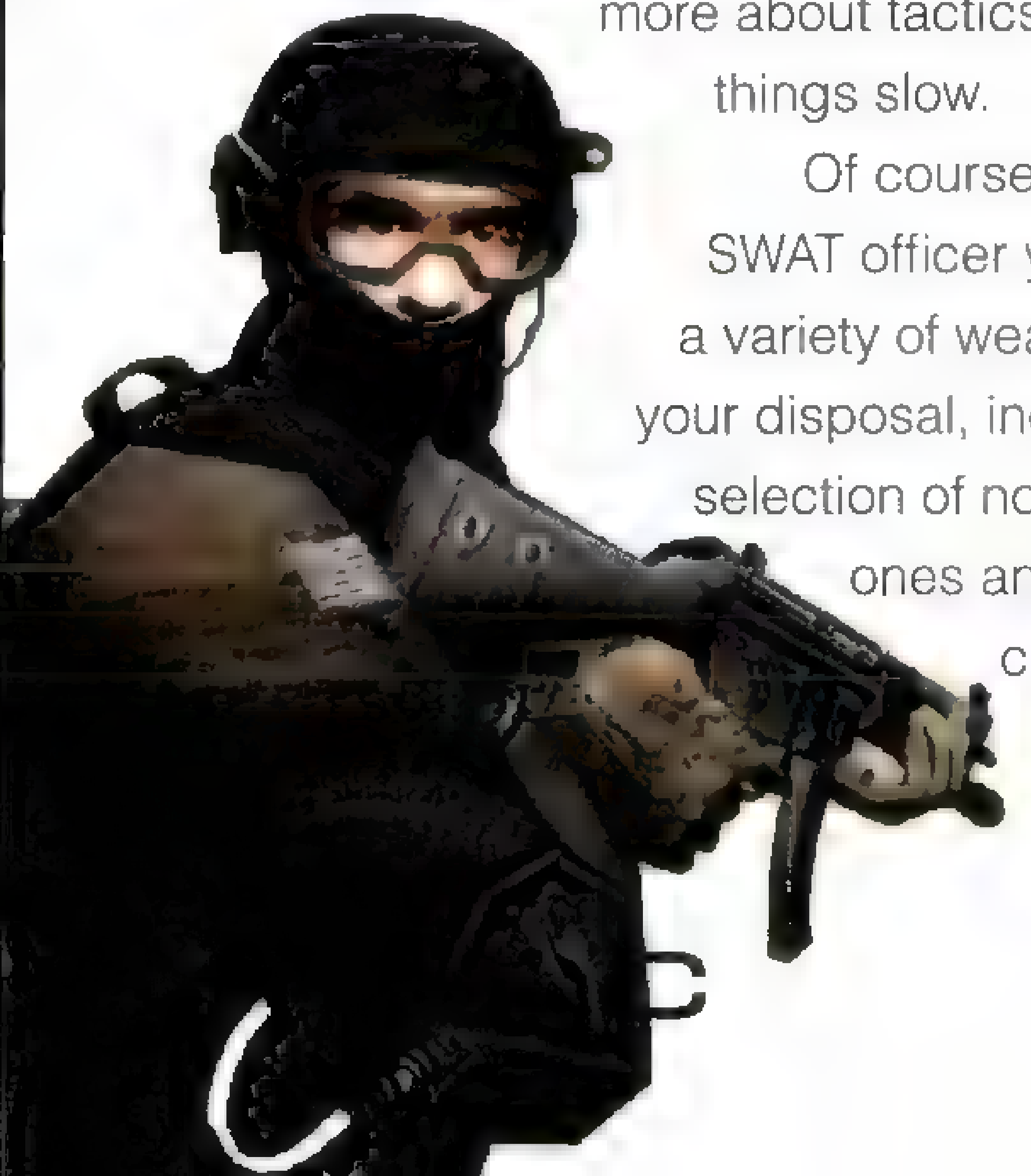
Of course, as a SWAT officer you have a variety of weapons at your disposal, including a selection of non-lethal ones and, in the case of SWAT 4, it's these latter weapons that are at the forefront of gameplay. You'll spend most of your time flashbanging entryways and gassing opponents. In fact, it's not unusual to find yourself at the end of a scenario with the same number of rounds you started with. All the shooting is replaced with giving orders using an intuitive mouse-based system.

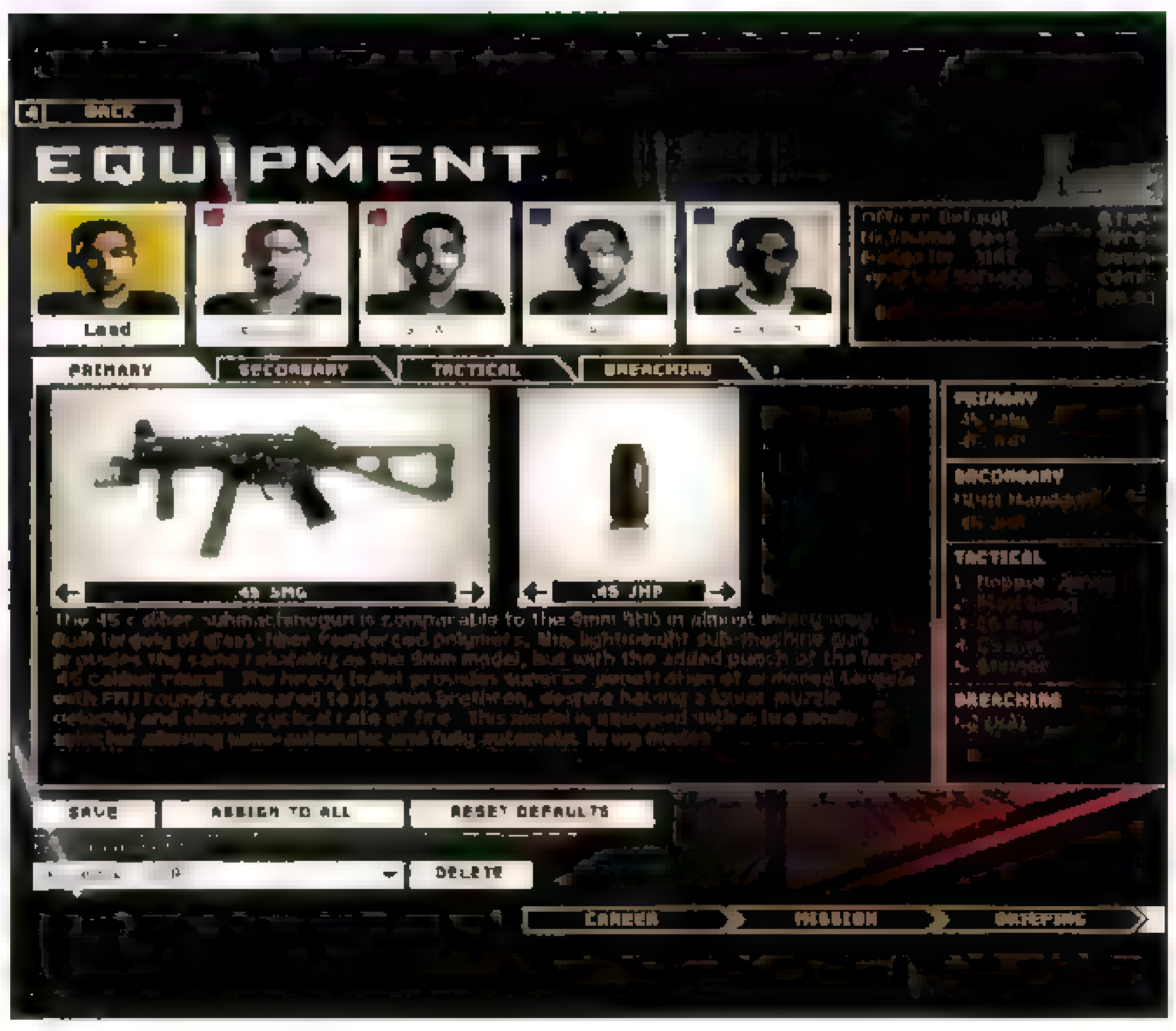
Considering this is a main game element, the AI of your teammates is totally up to scratch. They intelligently move out of your way, inform you when you're in *their* way and shout if they spot hostiles.

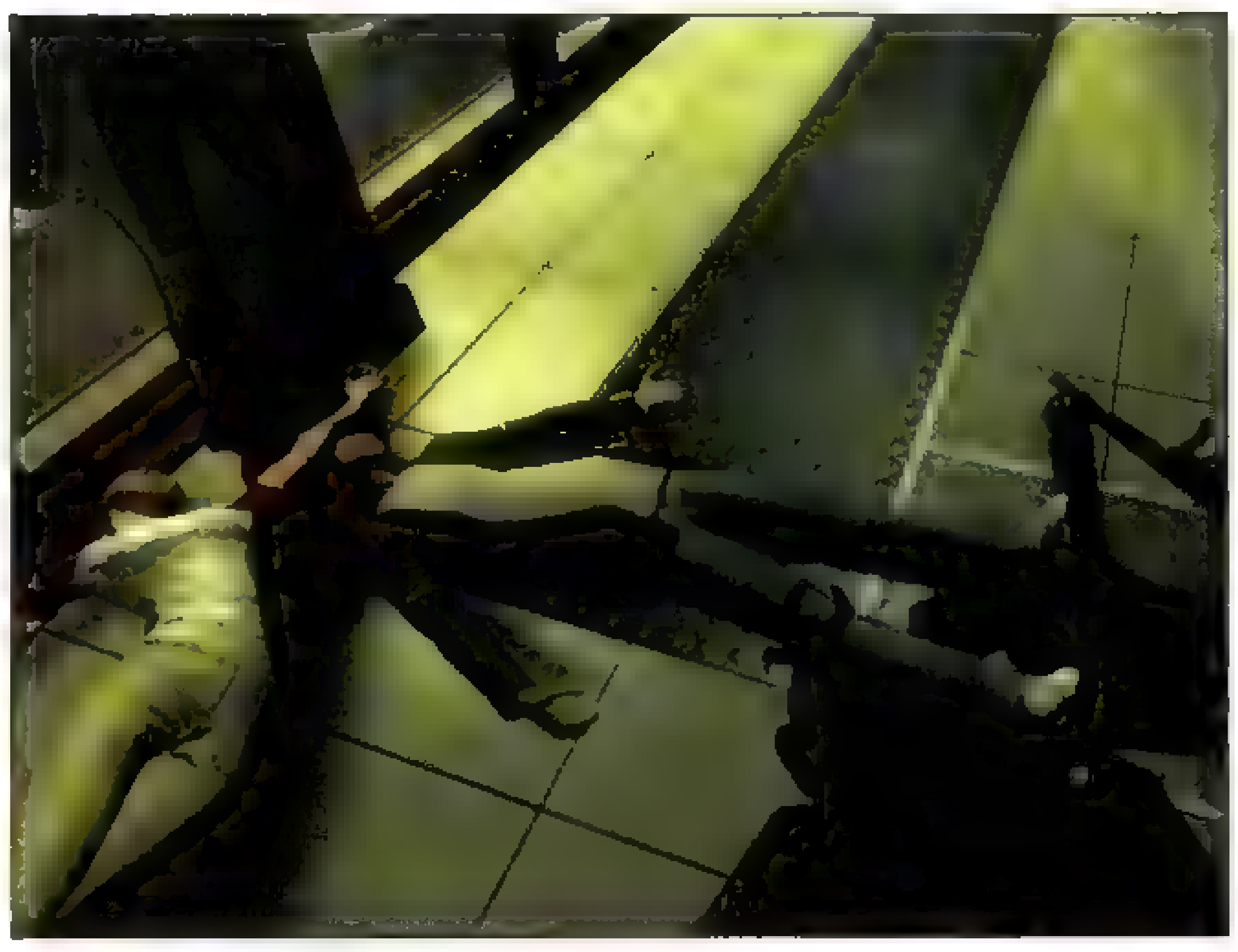
This level of situational awareness makes the game feel very dynamic. SWAT 4 also makes use of a 'window-within-a-window' so that you keep an eye on your other teammates. This window even allows you to issue orders to out-of-sight teammates so as to co-ordinate simultaneous breaches.

The only thing that spoils the game is a lack of character development. You never feel close to your team, relegating comrades to call signs such as 'breach guy' and 'dude with the M16'. While Irrational put time into writing member bios, none of the information in them is expanded on. It makes the experience a little hollow at times.

Otherwise, SWAT 4 is a very competent addition to the SWAT series. There is definitely plenty of gaming in the single player, and even more in the co-op multiplayer and mission creator.







PC

Developer **Irrational Games**
Website **www.swat4.com**
Recommended
2.4GHz CPU; 512MB RAM; 128MB DirectX 9.0 video card.

VERDICT

✓ Good pacing; well-implemented team control; great atmosphere.

✗ No character/team relationship development or overarching story.

score **8.5** OUT OF 10

PERIPHERALS FOR THE SERIOUS GAMER JOYTECH

Yes, you can get her to take it off, you naughty person you.

Playboy: The Mansion

Logan Booker has four girlfriends. No, seriously.

When The Sims first came out back in 2000, I had a hard time understanding its appeal. Surprisingly, my idea of intense gameplay does not involve taking a dump, cleaning up or checking the mail. Real life caters for these activities in abundance – and they most certainly are not fun. So when Andy, a friend of mine who was determined to make me play the game, invited me over one day for a look-see, I reluctantly agreed.

It took barely 25 minutes for him to build a mansion, deck it out, and get two sprightly-looking female Sims into a hot tub. It was then I realised what suckered people in – well, guys anyway – to The Sims.

This revelation was not a unique one. Developer Cyberlore and publisher Ubisoft also uncovered this grail of gameplay. The result of course is Playboy: The Mansion – a joint sting on the ghetto of games by Playboy and Ubisoft with nothing but a thin plot and a pair of norks.

The game's presentation is somewhat basic. Two play modes are available – mission and sandbox. To avoid falling fast asleep in the cleavage of your keyboard you'll want to go for mission-based play, the reason being that the game, beyond the nifty animations, ridiculously proportioned female models and the magazine component, has no pliable depth beyond this play mode.

Regardless of which mode chosen, the player is put in control of Hugh Hefner and tasked with the creation of Playboy magazine. Each month, it's up to you to compile an essay, interview, article, pictorial, cover shot and centrefold and release the magazine into the wild.

Seriously though, no one is playing this game for its publication element – it's all about the nudity. While the game does feature exposure of the upper-body, it's not hard to get women topless once they hit the mansion and, to be frank, after you've seen one, you've seen them all.

Conversation is the backbone of the game. Dialog can be driven by friendship, business interests or romantic pursuits and depending on what options you choose while talking to the numerous characters, your disposition with them will change. Once you have a strong romantic link with a female character, they'll do pretty much anything you ask, including cover shoots, interviews and mildly offensive intercourse on whatever piece of furniture takes their fancy. Again, you'll tire of this fast as the game lacks any real character development.

If you're looking for an actual game beneath Playboy: The Mansion's shallow exterior, then you'll be looking for some time. The game is a guy's version of The Sims, and because of this, it feels extremely vacuous, even a little childish, compared to EA's offering.

PC

Developer **Cyberlore**
Website **www.playhef.com**
Recommended
800MHz CPU; 256MB RAM; 32MB video card.

VERDICT

✓ **Publication element; cover shoots; low system requirements; boobies.**

✗ **Unashamedly rips off The Sims; extremely repetitive; can be cumbersome.**

Score **6.5** OUT OF 10

PERIPHERALS FOR THE SERIOUS GAMER JOYTECH™

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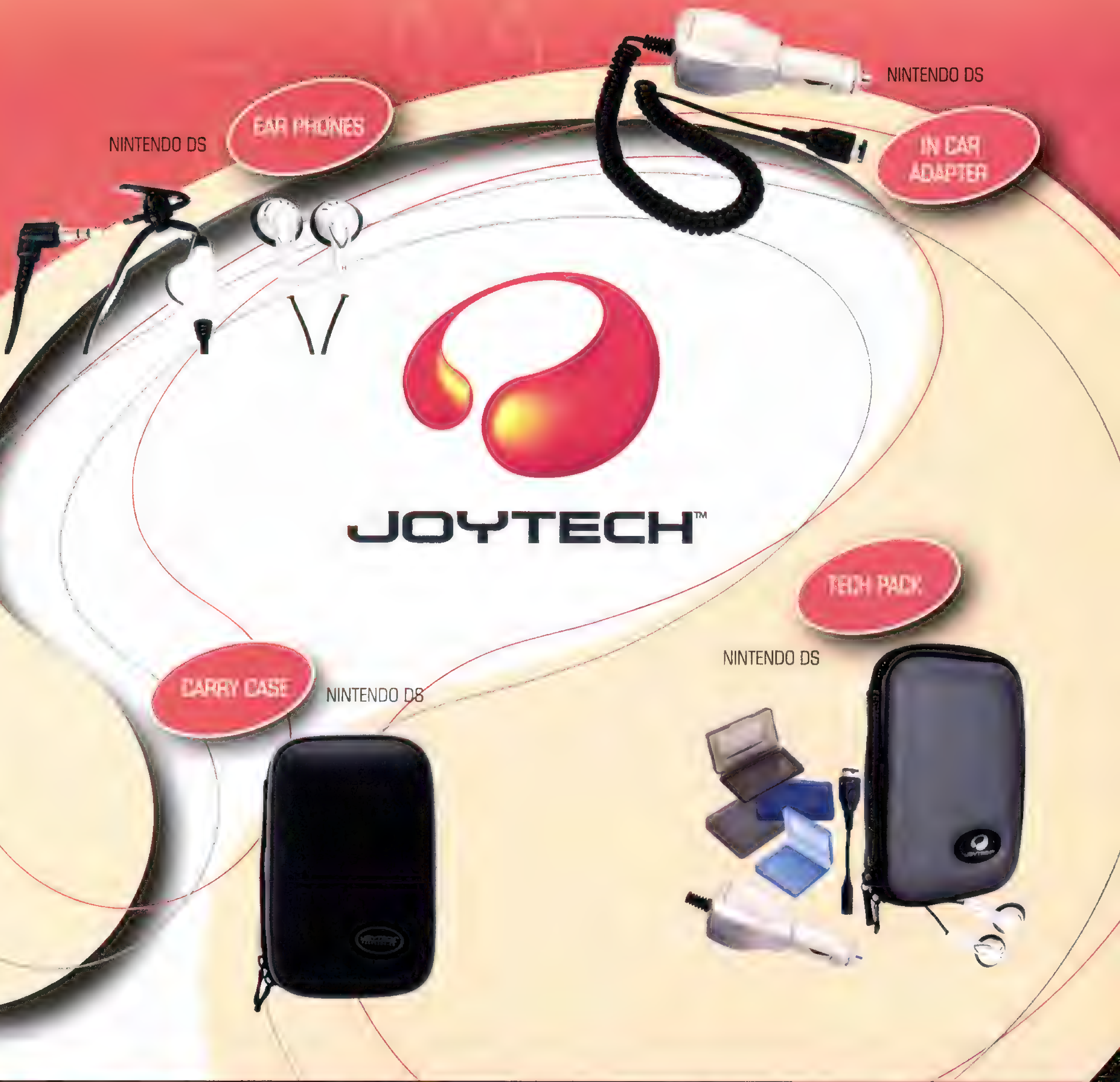

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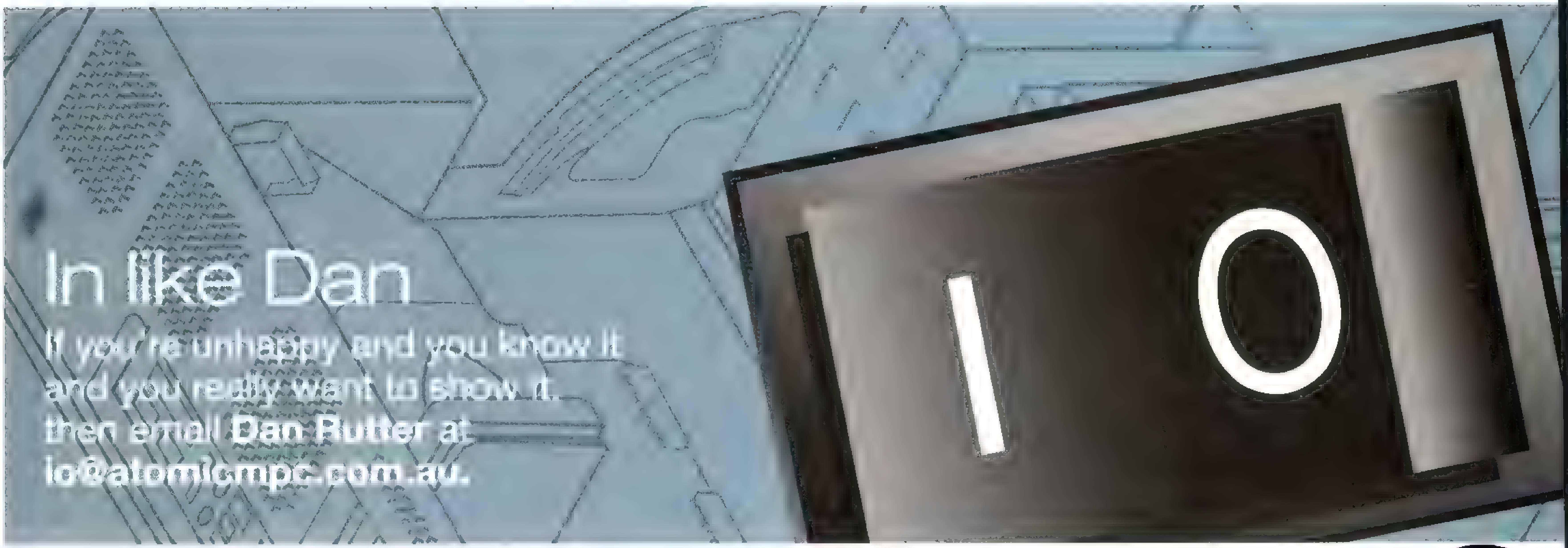


In like Dan

If you're unhappy and you know it and you really want to show it, then email **Dan Rutter** at **io@atomicmpc.com.au.**

Make space! Delete C:\WINDOWS!

There's a giant archived file on my hard drive called 'win386.swp'. I'd love to turf it, but I'm not sure if I should.

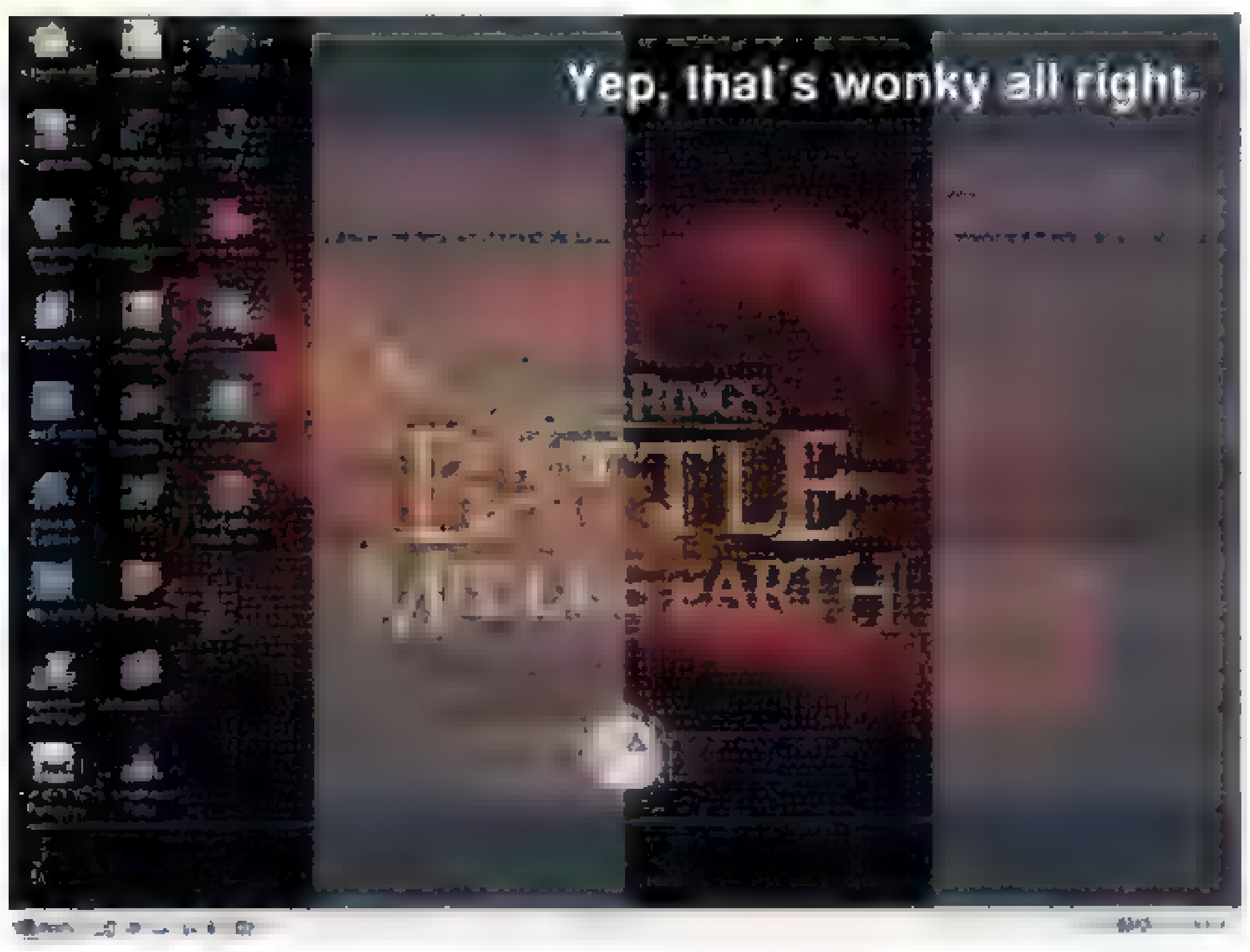
What would happen if I did?

Kim Furey

It's not an archived file; it's the swap file. You can't delete it while Windows is using it, but if you boot in Safe Mode or from a boot disk or what have you, you can. Windows will just recreate it when you restart, though.

Oh, that ain't right

I have a reasonably fast computer. Athlon XP 1700+, RADEON 9600 PRO (not overclocked), 512MB RAM, and a nice WD 8MB buffer hard drive. Not too shabby for playing most games. But recently I've run into a problem where when I start up a game and the 3D engine starts going, the entire display goes, for lack of a better word, wonky:



Yep, that's wonky all right.

I can still see some of the goodness that I now cannot play. For example, the lovely Lord of the Rings title screen now has blue and red and green sparklies. Not what Tolkien had in mind, I think.

The problem stays with the computer into Windows 2000 after I shut down the game. But all I have to do is restart the computer, and everything works fine, I can play with all of my Rohirrim and orcs again.

Do you know what might cause this problem? I thought at first maybe the power supply (which is a generic 300-350W unit) might be the problem, or I thought it might be my monitor. I ruled out the monitor, as Print Screen catches it too.

James

It's conceivable that the PSU is the problem; flaky power can cause many strange symptoms.

If the card screwed up every single time you used 3D mode, I'd suspect bad RAM or a dying main chip (you can get similar symptoms by over-overclocking a video card)

If it doesn't happen all the time, though, my chief hardware suspect would definitely be the PSU. It could be a thermal problem, though; if the video card fan's dying, that might account for it.

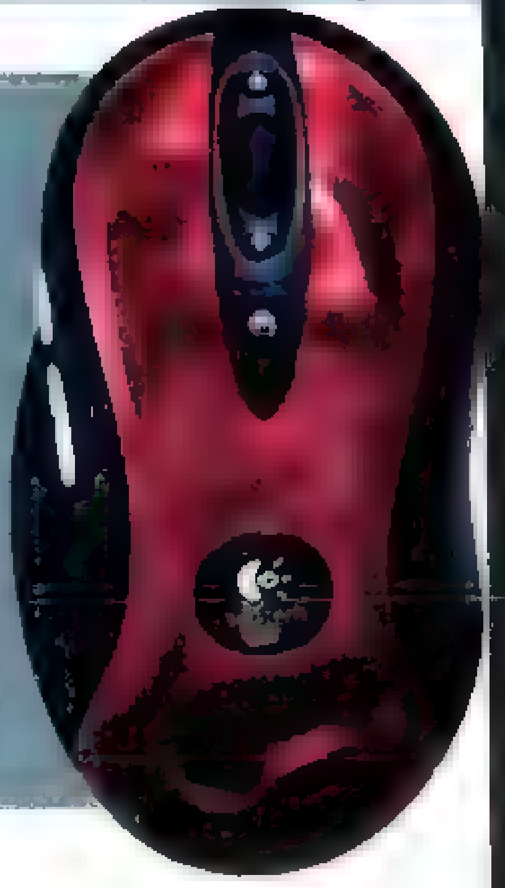
So first, take the sides off the case, aim a desk fan in there and see if problem goes away. If it does, then you have lousy ventilation to blame; check the fan, clean out dust, maybe install better system fan(s) if the card fan seems fine.

If it's not thermal, then it's time to buy a new PSU – a good brand name 350W should be more than enough. Swap it in, see if it helps. If it doesn't, then you still have a spare PSU out of the deal, which is always good to have.

Next possibility: Something eldritch wrong with the video card, like minor static damage from when it was installed

IOOTM wins a Logitech MX510!

If PC mice were hot babes, then the MX510 would be the Cameron Diaz of the pointer world.



Smokin'!

I have (well, had) an ASUS A7V600 motherboard, and an Antec SL350 power supply. The motherboard is now fried. All the +5V lines on the ATX connector are burnt up. This seems to have been a gradual process. The system started rebooting erratically. At first, I thought it was the video card, and when I swapped out the FX5600 for an older GeForce256 I had the problem went away… for a while. Eventually I took everything apart and found the burnt-up ATX connector.

I have metered the +5V lines on the PSU, and despite being burnt-up, they are delivering precisely +5V. So, I am guessing the problem was that the motherboard was drawing too much current. Antec has offered to replace the PSU, despite it working fine, as clearly it is of no use with a deformed ATX connector.

Can you suggest why this may have happened? Shouldn't the PSU have cut the power upon discovering the motherboard was drawing too much current? Should I be worried about damage to my 5V USB peripherals, which I assume are wired directly into the motherboard? I have swapped the motherboard, but am using the same CPU, RAM, and peripherals, and everything seems to be working fine, but that's unsettling, it seems to me that there should have been more widespread damage.

Sean

It's more satisfying when hardware dies spectacularly.

Should the PSU have shut down? Yes. The problem is the PSU had no way of knowing that.

If a rail's shorted to earth – thanks to some catastrophic component failure, or because you've just slammed a cable in the side of the case when you closed up the computer – then the PSU will pop its fuse, though not necessarily quite in time to avoid creating some smoke. But if the current being drawn from the PSU isn't above its rating for that rail – or even if it is above the rating, but not by much – then the PSU will just reckon it is business as usual and keep on trucking.

The power draw of a computer can, after all, vary considerably in one session. Switch from a boring office app to a 3D game on a modern PC and you could suddenly be drawing a hundred watts more, almost all of it going to the CPU and the graphics card.

The 5-volt rail of a typical decent '350W' PSU is likely to be rated at an easy 30 amps, though the aggregate rating of the 5V and 3.3V rails isn't likely to be more than 200W. It's still easy though for a slowly developing short – perhaps an electrolytic capacitor failing in an unusual way, or a similarly flaky regulator, or just a mislaid screw jiggling about on the board – to get maybe 20 amps flowing through a few traces on the board that are only rated for a few amps. Result: Melted connectors, nasty smells, etcetera.

If the semi-short is in an inessential component – like a smoothing cap – then the computer can keep on working even as it burns up, and then go flaky as the disease progresses. Most of these sorts of problems are more of the flash-bang variety, but slow burns are far from unknown, even when all of your cooling fans haven't failed.

Your USB gear is probably OK. If the PSU itself hasn't gone bananas – and it doesn't sound as if it has, though you'd have to test it under load to be sure – then nothing that isn't currently obviously fried should have been harmed. No guarantee is expressed or implied by the above statement, though.

I/O OF THE MONTH

Suck a brick

I recently saw a show on TV about developments in the jet engine, specifically the fan blades. They're now so advanced and efficient that the average 747 engine can suck in around one tonne of air a second.

Taking this into consideration, and scaling it down to the size of the standard 80 x 80 x 25mm case fan, why can't the fan makers use the same technology (in plastic form) and make case fans that can suck a brick out of a wall?

Surely someone could copy the fan blade design and make it (and not make it sound like a jet)?

Tim

On the face of it, a jet turbine-style of fan looks like a great thing to use for ventilation. Jet engines are very good at accelerating air; that's why they produce their maximum thrust (around 28,000 kilograms for current 747 engines) when the plane's sitting still on the ground, not when it's haring along at 37,000 feet. The purpose of the short duct in front of the main fan of a turbofan engine is actually to slow down the incoming air, so the fan can grab it better when the plane's moving fast.

You wouldn't want to use a whole multi-stage jet engine design, of course, as there's no reason to actually compress the incoming air if you're not going to squirt fuel into it. You also wouldn't need to make each turbine blade out of one crystal of metal, with a hollow middle for cooling airflow. That's good, because it'd probably drive the unit price up a bit. Just a plastic replica of a turbofan engine's front compressor fan would do.

Jet compressor blades are, however, tuned to drive air in against high backpressure. Air isn't just being squished in there, but it's also feeding a constant fire that pushes the internal pressure up much further.

A fan made to work in a situation like this needs blades with little space between them, essentially so that air trying to get out past one blade will hit another.

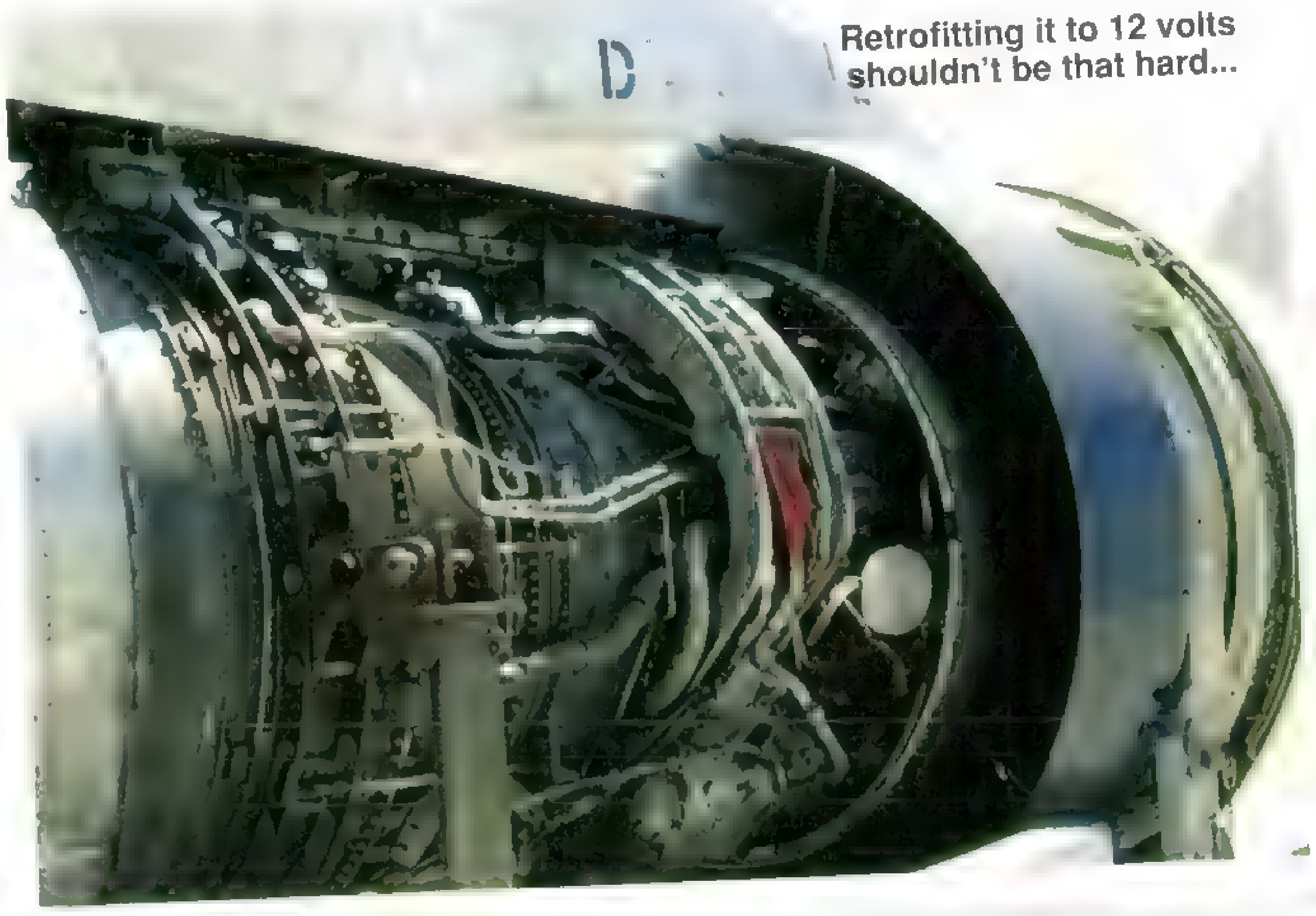
This sort of fan, though, isn't actually very efficient, because close-spaced blades has to plough through. This is why propeller-driven planes (and helicopters) always have as few prop blades as possible – better to have two long blades than three or four shorter ones, as long as the long ones don't hit the ground.

Some model planes even use single-bladed propellers, with a counterweight on the other side of the blade, but thrust that moves round and round the prop ain't good for the bearings.

Close-spaced blades can be optimised to work alright at particular very high speeds (as they do in jet engines), but at lower speeds you can't do the same tricks with shock waves and resonances, and in a computer application you don't need that kind of fan design, anyway.

Computer fans are generally driving air against the pretty light resistance of the stuff inside the case, and the fan grilles. They can therefore get away with having fewer, broader blades, with gaps between them to keep the low-speed efficiency up (and the turbulence noise down). For low pressure air-moving, the computer fan design works better.

I bought a high-tech remote-controlled pedestal fan, once. It has thin compressor-style blades. It makes a lot more noise than a normal cheap fat-bladed fan, and moves a lot less air.



Retrofitting it to 12 volts shouldn't be that hard...

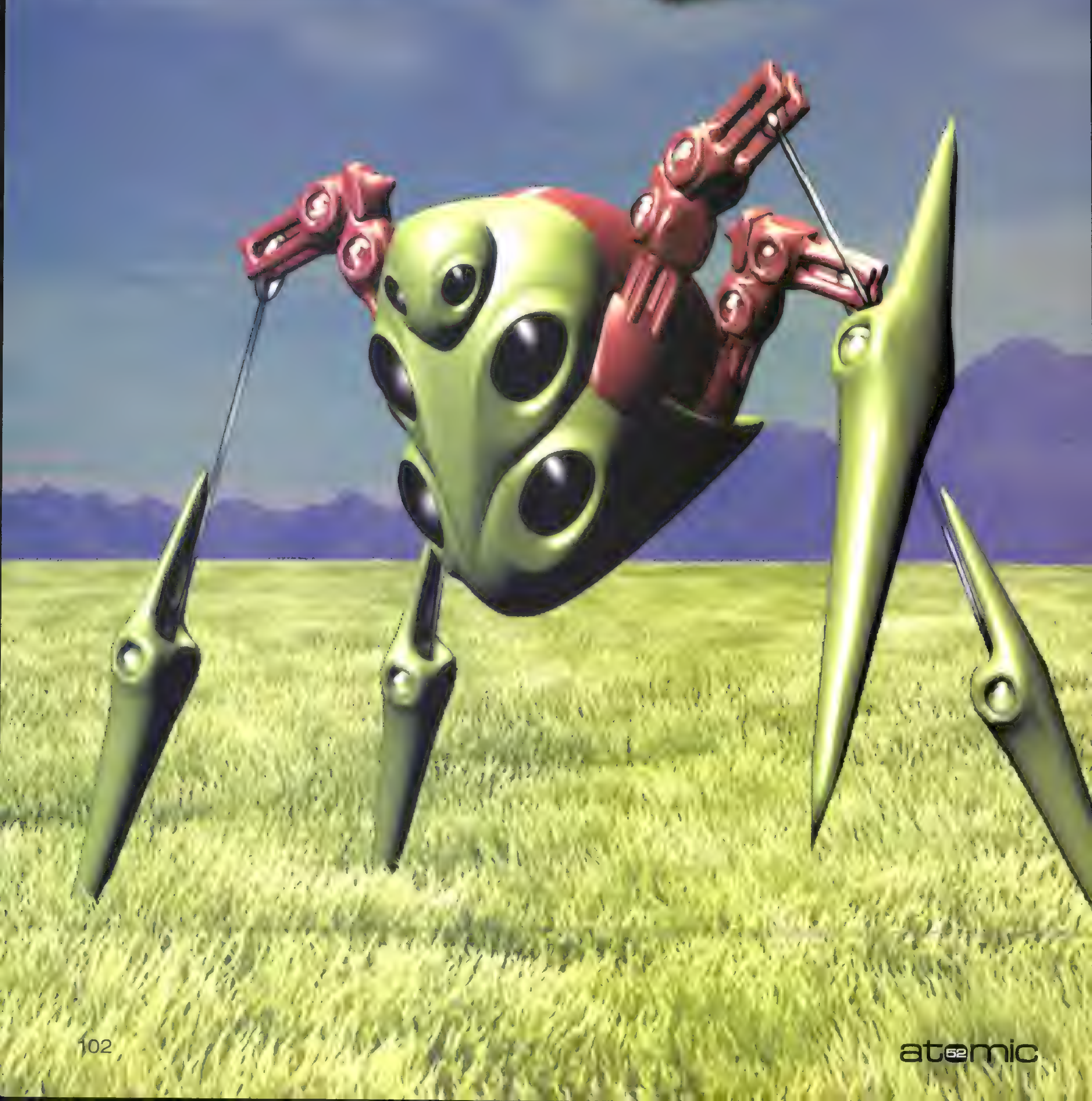
artomic of the month

WIN! $1995 Combustion 3!

'The bug was modelled with Maya 4.5 the background was modelled with Bryce 5.0, both models were then composited and rendered with Maya. The inspiration for this pic was Tribes: Vengeance and sleep deprivation.' – *Joel*

Create the winning Artomic and win the latest version of Combustion, valued at **$1995**, from **discreet**!
Email a preview (no larger than 5MB) of your masterpiece to:

artomic@atomicmpc.com.au



Welcome to the all new Hotbox page! Each month we'll feature the winning Hotbox of the Month as voted for online at **www.atomicmpc.com.au/hotbox.asp**. Not only do the winners get to show off their box in full glory for all to see on this page, but they also win an nForce3 based deluxe motherboard courtesy of Biostar!

IRumPiG's Rig

The first thing I did on the case was hack up the backplate to allow for a second power supply. I then started on the front panel by cutting a hole for the 120mm fan at the front, the fan was modded to look like a turbine by using a nose cone from a model airplane.

I sprayed the fan blade assembly using a chrome spraycan and modified a 120mm fan grill to accomodate the nose cone.

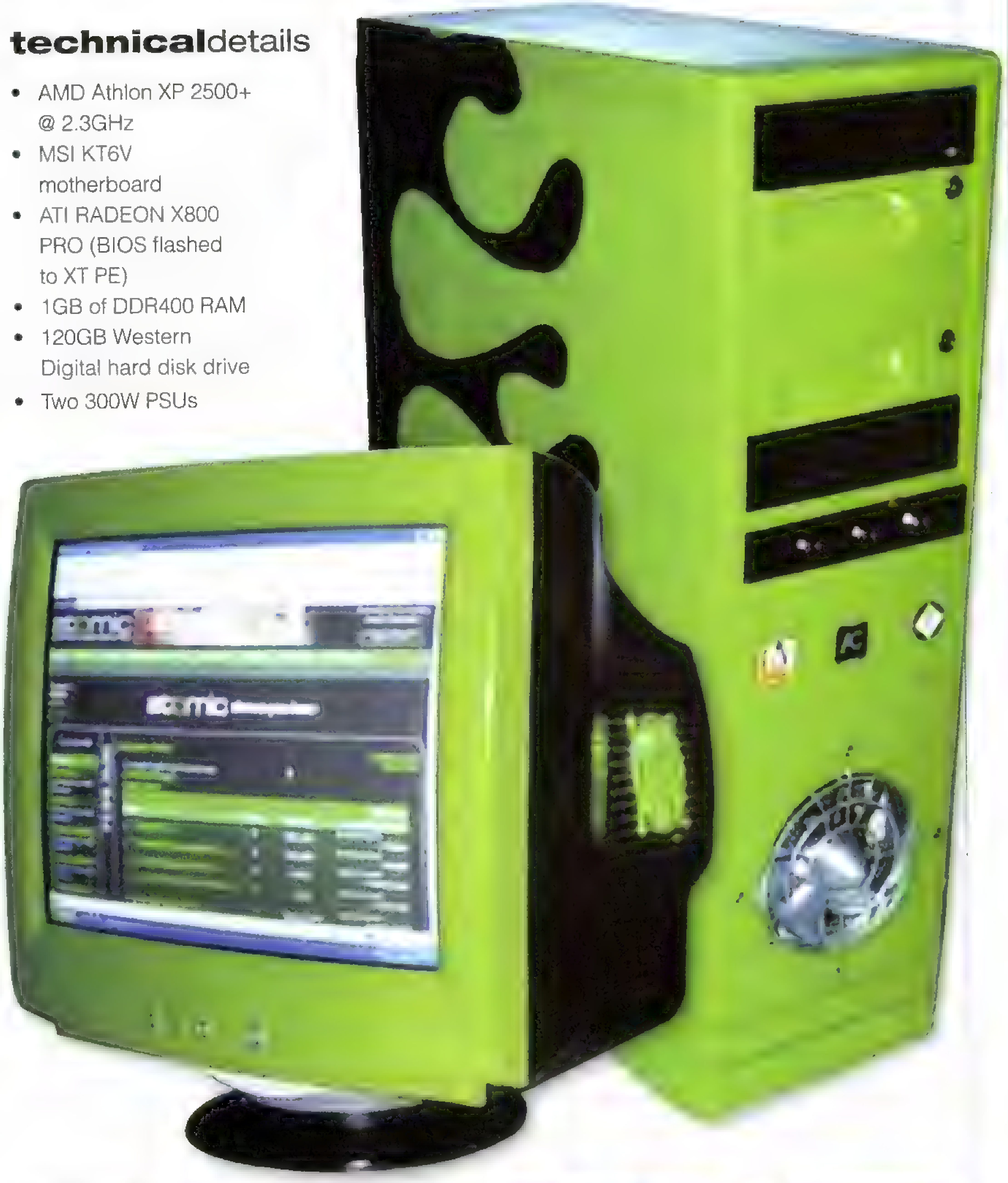
My girlfriend drew the design for the splat/window on the side panel. I was stoked! The pattern worked sweet. I added some CCFLs, then added switches on the front for the lights and LED case feet.

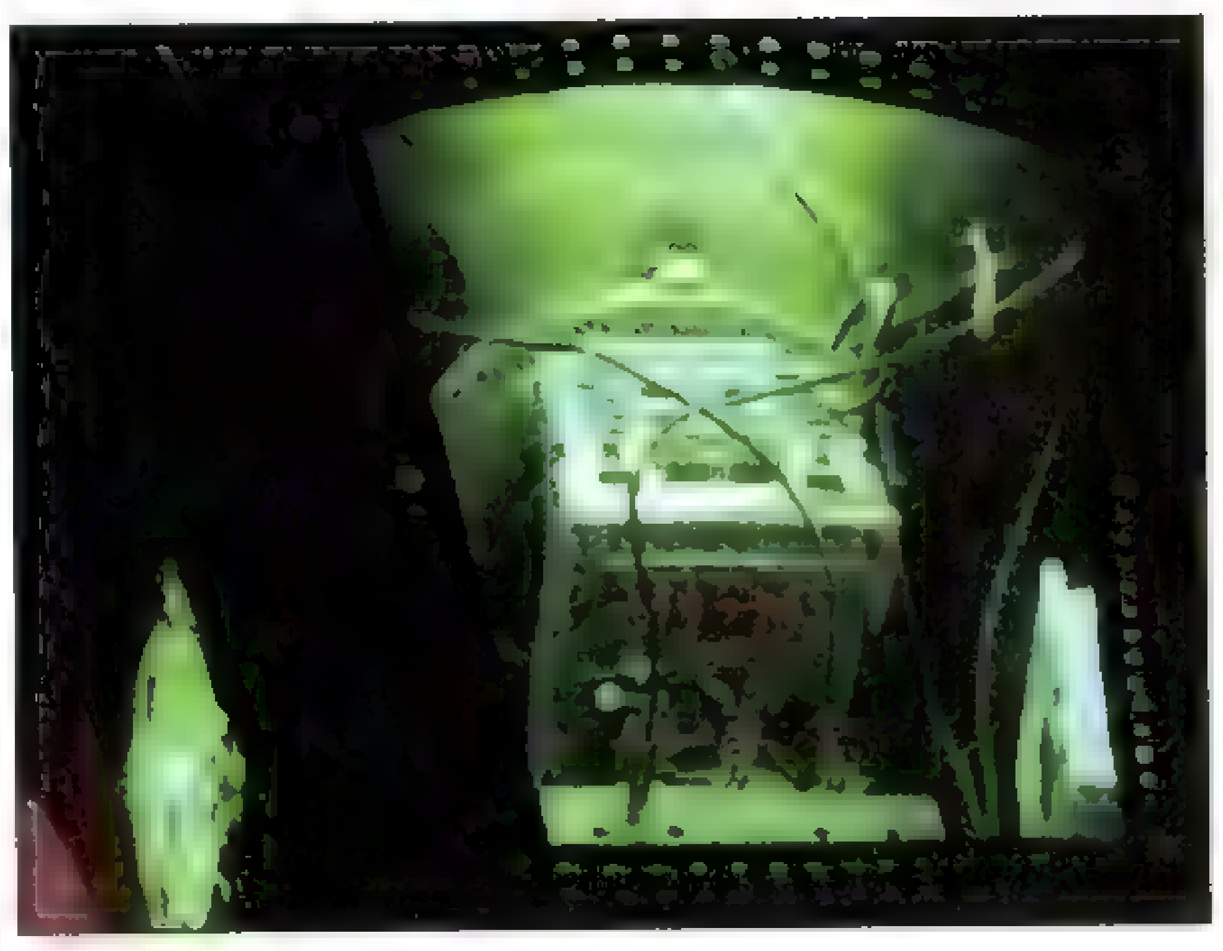
Then came the task of fitting everything into the case (it was tight but I managed).

Lewis

technicaldetails

- AMD Athlon XP 2500+ @ 2.3GHz
- MSI KT6V motherboard
- ATI RADEON X800 PRO (BIOS flashed to XT PE)
- 1GB of DDR400 RAM
- 120GB Western Digital hard disk drive
- Two 300W PSUs





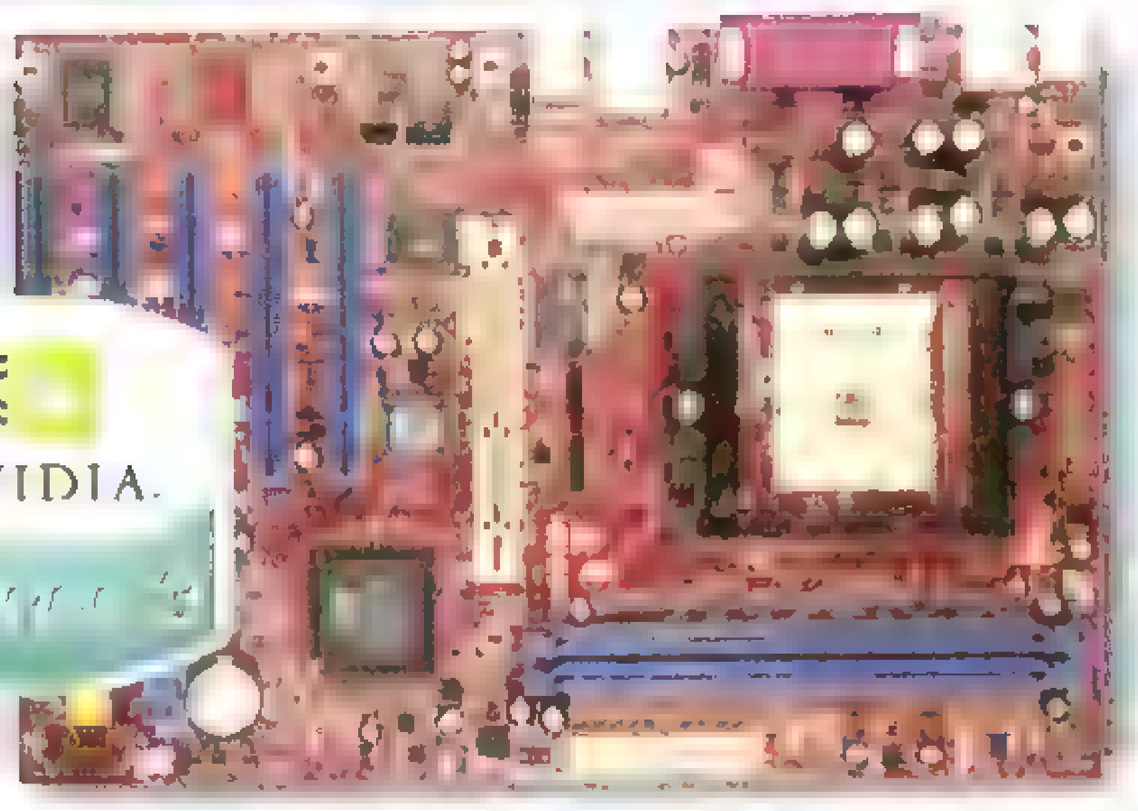
Fame, fortune, and free stuff can be yours! Send your Hotbox to hotbox@atomicmpc.com.au and include the following:

- At least four high-resolution, well-lit pictures of your box, preferably from different angles.
- A 250-word description of how you made it, the obstacles you overcame, the tools you used, and your inspiration.
- A detailed list of the machine's specs, including any overclocking you may have done.

BIOSTAR®

Hotbox of the month wins the
Biostar K8NHA Grand!

- NVIDIA nForce3 250GB chipset
- DDR400/333/266/200
- SATA and PATA support
- AGP 8X
- 6-channel audio
- NVIDIA Firewall, NVRAID



VOTE ONLINE NOW! www.atomicmpc.com.au/hotbox.asp

Acquisition!

You can only enter once per competition or you'll be disqualified. You must provide a postal address and phone number for prize delivery when you enter (not a PO Box).

3 x Fusion HDTV DVB-T USB Tuners

High definition television is here and you shouldn't be left in the past. There's hardly a better way to experience the wonders of DVD quality free-to-air than with this marvellous unit. Equipped with a remote and a no-nonsense interface, you can win one of these insanely good digital tuners for yourself, courtesy of PC Case Gear! Ensuring you all get a piece of tasty pie, the distributor, Lako Pacific, has a $30 cash back offer on all purchases of this unit up until June 30th. For more info on this and other top gadgets, give them a buzz on 1800 657 601 and tell them we sent you.

To be in the running for high definition bliss, answer this question correctly

What 1970s sci-fi TV show's remake has a female character in place of the originals male and who was it?

2 x GeIL 1GB PC3200 Dual-Channel kits

A happy machine is a machine with wads of fast memory. Worth $240 each, a dual-channel kit with two sticks of 512MB DDR400 RAM never looked sexier. With blue heat spreaders, if you were to use this high performance memory in your machine, it will want to have your babies. Thanks to the generous folk at PC Market (**www.pcmarket.com.au**, or 1300 726 825), you can have a whale of a time with your machine remembering far more than you thought possible. Which is either a good thing or a bad thing, depending on your level of torturous computing habits. To win, unless you forget, you should know exactly what you need to do

In the 1995 movie *Johnny Mnemonic*, what was the maximum amount of data Johnny could normally store in his brain?

5 x copies of Pariah for Xbox

The year is 2520, Earth is now a prison colony and you are Dr. Jack Mason, who's job it is to collect unwell prisoners from the planet for off-world treatment. There is also an unexplainable disease that's affecting the residents. Sound bleak? It gets better, doc. Particularly with your newly incapacitated drop ship – on takeoff you are shot down, so now you're stuck on the most cursed, disease-ridden planet available. All thanks to THQ, you have the chance to uncover the abounding mysteries and experience this era of our doomed planet through first person shooter and vehicular missions. But first, you must pass the test:

Pericles, believed to be the founder of democracy in Athens, died of what in 429BC?

PARIAH
CAN YOU SURVIVE?

Email entries to **win@atomicmpc.com.au** or post them to: Atomic, 52 Victoria St, McMahons Point, NSW 2060. Please send a separate entry for each competition. Please ensure the competition name is the subject of the email, or is displayed clearly on the front of the envelope. The closing date for entries is 15 March 2005 Winners will be announced in *Atomic 54*

Atomic 50 winners: 5 x Atari Anthology for Xbox Q. From what Greek word does Anthology originate? A. 'Anthologia', meaning flower gathering from 'anthos' meaning flower and 'logia' meaning collecting. T. Ryan, Dubbo, NSW. A. Ekwebelam, Warrawong, NSW. D. Battams, Crows Nest, Qld. J. Coats, Waikerie, SA. 5 x USB Computer Desk Lamps Q. What is the medical term for nearsightedness? A. Myopia. J. Tai, Robertson, Qld. V. Hardy, Lara Lake, Vic. T. Lansdell, Werrington, NSW. P. Aurora, Strathfield, NSW. A. Krebet, Melbourne, Vic. 10 x NVIDIA Backpacks, USB watches and waist pouches Q. What is the heaviest load one person has balanced on their head and in what year was it? A. 188.7kg in 1997. A. McGeary, Howrah, Tas. A. Tansell, Main Arm, NSW. R. Mayhew, Albany Creek, Qld. D. McKay Ashburton, NZ. G. Trejo, Albion, Qld. G. Adzievski, Surry Hills, NSW. J. Bynon, Wallan, Vic. M. Epis, Mt Lawley, WA. N. Waters, Moruya, NSW. T. Pavlic, Redwood Park, SA. 5 x Seagate USB 2.0 Pocket hard drives Q. Which is faster: USB Full-Speed or USB Hi-Speed? A. USB Hi-Speed. M. Macalalad, Trott Park, SA. N Kwaitko, Coorparoo, Qld. P. Laub, East Mackay, Qld. R. Crane, Burwood, Vic. I. Simic, Wilston, Qld

Terms and Conditions of Entry. 1. The promoter is Haymarket Media of 52 Victoria Street, McMahons Point, NSW 2060. Promotion period is from 9.00am on 20.04.05 until 12.00pm on 18.05.05. 2. Entry is open to residents of Australia and New Zealand. Management and employees of Haymarket Media and their immediate families, and any advertising, marketing or promotional firms associated with this promotion are not eligible to enter. 3. Enter by posting or emailing forms to Haymarket Media. 4. The draw will be held at the offices of Haymarket Media at 5.00pm on 18.05.05. Winners will be notified by mail and published in *Atomic* 54. The prizes are not transferable or exchangeable. 6. The judges' decision is final and no correspondence will be entered into. 7. The promoter reserves the right to publish the winner's name and suburb for promotional purposes. 8. All entries will become the property of Haymarket Media.

Trivial Geek Questions

Angus Kidman likes-a-the Mario.

Welcome to Trivial Geek Questions, the advice column that tackles all those niggling questions that occupy the spare time of technophiles anywhere. Are there medical risks involved in having a notebook PC on your lap all day? Could zombies take over the world? Submit your questions to **tgq@atomicmpc.com.au** or via the *Atomic* site, and we'll answer the best ones here each month.

Q: Hopefully you can resolve an argument for me: Which movie based on a computer game has made the most money at the box office? I'm fairly sure it wasn't *Super Mario Bros*, but don't have a clue otherwise.

AK: This isn't as straightforward a question as it seems. While undoubtedly important to movie studios and their hype-crazed publicists, box office data is often wildly unreliable. Data for movies more than a decade or two old is frequently inaccurate and/or wildly exaggerated by studios, and would need to be adjusted for inflation for a true comparison.

In recent times, data from the US in particular has become much more accurate and precise – and the US is still the most important movie market, especially as far as producers are concerned – but comprehensive global figures are still more difficult to come by. A movie with big ticket sales may still not make back its budget, while an apparent flop may be profitable if it is produced on the cheap. And in the era of rentals, DVDs, pay-per-view and TV broadcast, ticket sales may not be the most relevant measure of success anyway.

Not even the first ever touch-screen Swiss watch could make *The Cradle of Life* look like a timely idea.

With those caveats in mind, here's the global and US box office takes for a number of recent and not-so-recent cinematic video game adaptations, sourced from IMDb Pro (**pro.imdb.com**). The US numbers are pretty solid, but some of the global figures need to be taken with more salt than would be required to swallow the plot of *Alien Vs Predator*.

In any event, while there are probably better adaptations out there than the evident box office champion, *Lara Croft: Tomb Raider*, we can indeed be grateful that no-one is likely to ask Bob Hoskins to dress up as an Italian plumber again any time soon.

Movie All figures are in millions of US dollars	Year	US gross	Global gross
Alien vs Predator	2004	80.3	133
Double Dragon	1994	2.3	n/a
Final Fantasy: The Spirits Within	2001	32.1	n/a
House Of The Dead	2003	10.2	n/a
Lara Croft Tomb Raider	2001	131.1	252
Lara Croft Tomb Raider: The Cradle Of Life	2003	65.7	n/a
Mortal Kombat	1995	70.3	122
Mortal Kombat: Annihilation	1997	35.9	45
Pokemon: The First Movie	1999	85.7	96.8
Pokemon: Power Of One	2000	40.7	100
Pokemon 3: The Movie	2001	17.1	n/a
Pokemon 4: The Movie	2002	1.7	n/a
Resident Evil	2002	39.5	n/a
Resident Evil: Apocalypse	2004	50.7	120
Street Fighter	1994	33.4	99
Super Mario Bros	1993	20.9	n/a
Wing Commander	1999	11.6	n/a

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*At the conclusion of last month's **History of the Forums column**, Atomicans were reeling in horror at the abomination that was the Atomic Forums VeeToo (**www.atomicmpc.com.au/v2**). Now read on...*

Though it was both curt and smelt of teen spirit, VeeToo wasn't *quite* the nirvana that Atomicans had waited for. Thankfully, within a day, the real Atomic Forums V2 were unveiled. So most Atomicans giggled at the gag, gagged their gobs, and got gabbing again.

And the rest, as they say, is history.

The End.

Well, not quite.

The lead up to *Atomic*'s 50th edition found forumers reminiscing about their fondest posts in the four years of *Atomic*'s history (**forums.asp?s=1&c=1&t=56387**).

Saponification reminded everyone of the crevasses and cravats in the infamous Nekkid Thread.

NihilisticAutomaton disinterred ElvisIsAlive's necrophilic penchant for old graphics cards, while Goku1989 was reminded of the Greek tragedy in which a certain DJ fell madly in love with, er, his own alternate user ID.

CheekyChops recalled Dark Lord's enigmatic 1000-post resignation and eventual accidental resurrection.

Alpha reminded everyone why no true Atomican ever drinks Green slushies.

Kommando invoked the many foreheads of Morris, kittens down pants, Mael's forklift fetish and Frilock's soap opera. Johnsee remembered TheCode's scrambled syntax and the creativity of the custom *Atomic* trading cards.

So many memories, so much history, so many good times.

There have been almost three million posts on the Atomic Forums. Might be time for *you* to drop in and share in some of the next million's memories, hmm?

– Virt

potm

My god! It's full of avatars! Billions, if not dozens of them. All pretty and art-like. It is us as art.

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=60078

So Goth can get to work and make a version that contains everybody's avatar, and thus silence the 'you forgot mine' whinging, we're giving him the precision art device we call the Logitech MX510. Thanks Goth for your excellence.

Charge of the LAN Brigade

Maurice 'Moz' Ford picks up his mouse and heads off to war.

It was 11pm and outside my open window the night was slumberous and peaceful. All the good people of the world were tucked away in their beds. And into that blissful silence I screamed 'AAAAHHHH!'

You may be wondering what the hell I was doing. No, I wasn't trying for yet another eviction notice from the Body Corporate – I was playing a game on my computer. To your average person, my reactions may have seemed a little over the top. But to a gamer... well, it's more complex than that.

You see, games have become so graphically detailed and the gameplay so wonderfully immersive, that they are no longer games. They have become *reality*.

Need proof?

Take the humble car racing game. Gone are the 16-colour, top-down, joystick-and-two-button time wasters. These days you need your P-plates and two defensive driving courses under your belt before the game will even let you take a Daewoo round the carpark. Real? Hell yes, and I even have a scar to prove it. That'll teach me for leaning into corners too hard. (I've since moved my PC away from the wall.)

Want more? What about RTS? This is exactly the way *real* wars are conducted by the bigwigs, although they use sticks to push little plastic tanks around on a big table map. Changing views is accomplished by walking around the table. Whoopee.

We, on the other hand, have it all. We can rotate our views and zoom in and out. We can skip to any part of the battlefield with one click of the mouse. Issuing orders is instantaneous. Individual units are highly detailed and rendered to perfection. They gain experience, operate independently and even talk back to you. You become quite attached to them... Hey, don't try to tell me those little dudes aren't real! I saw *Tron*.

> **Virtual reality? Forget that. It's deader than Ray Martin's hairdo.**

First-person shooters? Where else can you lead a crack team of counter-terrorists against an equally co-ordinated group of baddies? Your team members sit at computers scattered all over the world. You instruct them in realtime with headsets. Their equipment was chosen with great care – their online lives and those of their team mates depend on it. Pulses race, palms sweat and the adrenaline pumps. Real? This is as real as it gets.

Virtual reality? Forget that. It's deader than Ray Martin's hairdo. *This* is reality. These games. Here and now. The wars of the future will be fought by us on our computers.

Imagine it – WWIII – The world's biggest LAN. It'll be just like *Ender's Game*, but with a lot more junk food. We can rase enemy nations to the ground without loss of life. No one will even get hurt.

Well, so long as their PC's aren't too close to the wall.

Still want proof? My 11pm scream was brought on by an ambush that scared the crap out of me. Proof? It's right here in my pants.

Crashtest #25 - "For Great Justice!"
INSTALLING LINUX...
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